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THE INDUSTRIAL-ARTS MAGAZINE

MARCH, 1919

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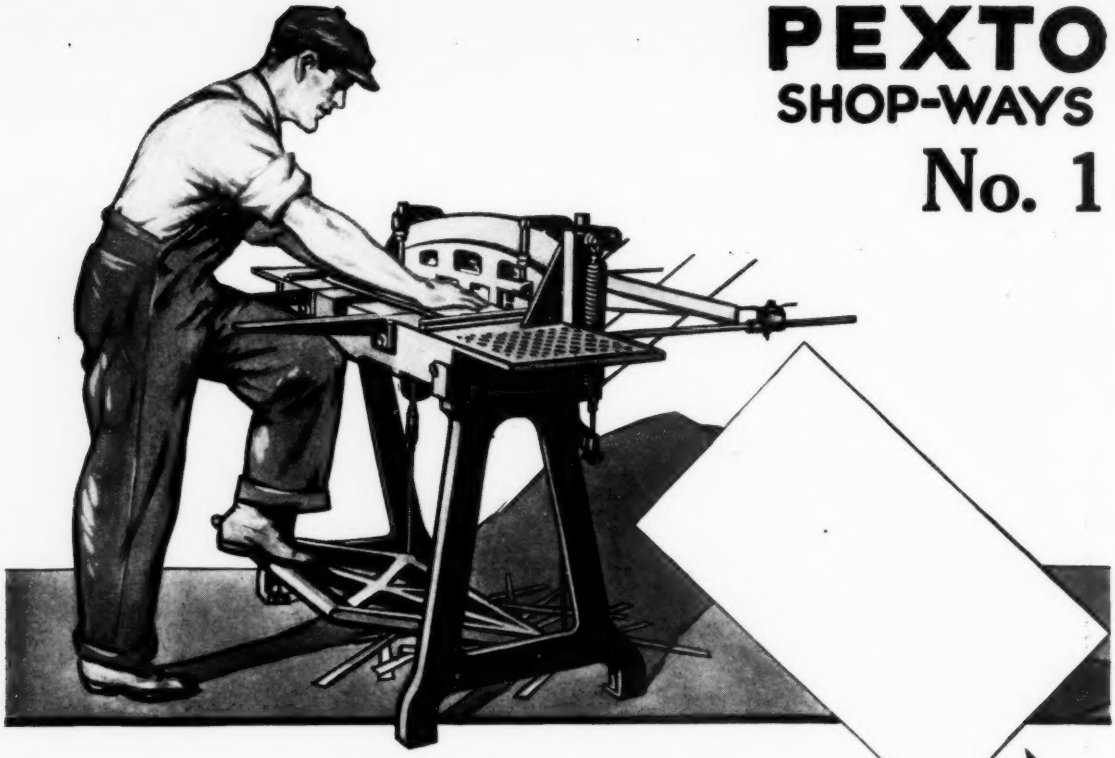
No. 1



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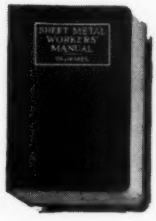

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PEXTO

SHEET METAL WORKERS' MACHINES & TOOLS

INDUSTRIAL-ARTS MAGAZINE

Vol. VIII MARCH, 1919 No. 3

Suggestions for the Ambitious Young Commercial Artist

Heyworth Campbell, Art Editor of Vogue, New York City

PRIMARILY, *a poster is a statement of facts* intended to create in the mind of the beholder a desire to buy or an impulse to act on its suggestion. This is true not merely of a big design posted on a billboard urging you to enlist in the navy or buy Somebody's Superlative Soap, but of every piece of printed matter intended to act as a sales agent.

And at this present time in the world's history the poster and the quality of poster value is more important than it has ever been before. There is less time for purely artistic experiment; less money to spend on proving somebody's pet theories of design and color value; *industry* and art are linked closer than ever before and the poster must deliver the goods.

Every industry starts with art. Even cams and gears have to be designed. Even the baking powder can needs a label. Dresses, hats, wall-papers, structural steel buildings—everything from a tin pot to a million dollar parkway, has to be designed on paper before it is cast or built or sewn. This is a thing that must be recognized by every teacher of drawing from the kindergartner to the professor; and I believe the art schools of the country will concentrate—indeed I know they are concentrating—on the development of their students to meet more *instantly* the demands of the industrial work.

That means co-operation. It means that the artist must understand the practical demands made by industry upon art. It means that he must be able to turn out a finished product with ease, surety, and speed. It means that he must not only be an artist, but a merchandiser of his art, and a merchandiser of his employer's goods.

Let us first take up the problems that confront the *young* artist.

The prime requisite of success, it seems to me, is the establishment at the very beginning of the right point of view.

I cannot emphasize too strongly the fact that there is no editorial conspiracy on the part of editors and art men to keep the young artist down. We are always in search of good, new, promising young artists. We will go to considerable pains to develop and bring out the talents of some youngster who impresses us as being worth education, in the particular problems with which we have to deal.

This is not altruistic. It is merely sound common sense. Investment of the artman's time in such young artists is well repaid by the success of their work — a success in which artist and merchant equally share.

Once the young artist realizes that there is no conspiracy against him; that the art man is a fellow-worker, he has established one foundation-stone of success.

He establishes another, when he finds that he can take a joy in his work, and get real pleasure out of tackling an uninteresting problem—the kind of tough problems that we all have to conquer before the finished product actually comes out on the printed page.

Of course there are many discouragements. *Nothing worth doing was ever easy.* But I am convinced that the most important single factor contributing to the artistic and commercial success of the few who have made good is that they have tackled the game in a healthy, wholesome, natural way. Instead of insisting upon being *"unappreciated geniuses"* and talking as if there were a concentrated campaign against high ideals and originality, they have honestly tried to find out what the manufacturer needed, and have set their energies to giving it to him without the sacrifice of *their own ideals of beauty and art.*

Too often the beginner presents for inspection, work which shows only *indications* of talent instead of *examples* of *his ability* to use this talent. Most of the specimens presented for the fascination of that brute, the art man, suggest that the artist produced them only after almost superhuman effort. Of course this is wrong. The samples submitted should give the art man the feeling that the artist can easily live up to the standard of the samples when given a commission.

The average student is impatient to tackle an ambitious effort before he can with ease and certainty produce a simple composition.

That, I believe, is the reason why so many students—and even professionals—show a tendency to represent themselves with samples that do not do them justice. A simple thing well done is far better than an over-ambitious thing hopelessly badly executed.

A very easy way for the beginner to make a big showing, but a false and dangerous one, is to take up the eccentric style, now so common, and so much abused. No matter how clever, unusual, or distinctive one's style, development, to be substantial, must be built on a solid conventional foundation. Many a

Talk before the Eastern Arts Association Convention, April 5, 1919.

young artist has tried to out-Plank Plank, out-Erte Erte, and out-Dryden Dryden before he could draw a hand correctly. Such a beginner will cheerfully tackle things that Dryden herself will attempt gingerly; and then wonder why his work is not appreciated. Never slight or underestimate the true value of the conservative illustration, poster, advertising or fashion drawing.

Distinction is the Result, Never the Object, of a Great Mind.

Now let us assume that the young artist has passed thru the initial stages of becoming a professional artist in the graphic arts field. He has the right point of view, he has a general knowledge of the field, he has determined his individual style, and he has a portfolio of samples so professional looking that if there were size marks and engravers' thumbprints on them the wisest art man would believe they had been reproduced and receive him as if he were J. Monty Flagg himself.

Let us for a moment take up the problem of specifications given by the art man to the artist. And in this connection we will touch for that promised five minutes on the mechanical limitations of reproductive processes.

To my mind, specifications should be as simple as possible. The thing to give the artist is not limitations, but latitude. True, he must have the general conditions governing the problem; there is no use wasting your artist's time designing a setting for the Hippodrome when you intend to mount your play on the miniature stage of the Princess Theatre. But, aside from these unusually obvious limitations I am a firm believer in giving the artist absolute freedom as to method of treatment, subject chosen, and feeling to be conveyed.

"Forget how Frank Brangwyn, or Howard Pyle, or the Leyendeckers treat such a problem," let us say. "Forget how anybody in all the world ever did an illustration. Try to do it your own way. Try to do something so unusual, so out of the ordinary, so unexpected that you don't believe the art man can muster up sufficient ingenuity to get it into reproduced form at all."

It is a constant source of wonder to me how contented many people are to see the world as a series of stock formulae. They don't look at what is there at all. Using their eyes seems to be a habit they never heard of. There's Fifth Avenue. How many people passing up and down see it at all? It is a row of shop windows with bargains or non-bargains in the windows, and the old flower seller with the tray of golden daffodils is just selling them at a quarter a bunch. There's the sunset, a magical crimson glory at the end of the stone canyon of Forty-fourth Street. Do *they* see it? *Not much*; it's only getting time to turn on the lights in the office. I knew two girls in high school, one of whom had the writing gift. The composition was to be on Sunset in Autumn. The girl *with the writing gift* went out and looked at the sunset, smelt the dying leaves and the wet meadows of autumn, turned up her coat collar against the sharp wind, played with a little cold kitten mewing outside a shut door, and went home to write of what she saw. The other girl sat in the warm library and read the "Death of the Flowers" by Bryant. Her composition was perfectly correct warmed-over Bryant; but the other girl's won the prize. Sometimes it seems as if half the secret of being an artist is only to look upon the world with fresh eyes, as if nobody in all history had ever beheld it before, and write or paint or draw just simply what you yourself truly see.

The same thing applies to self-criticism. It surprises a young artist when you say to her, "Tell yourself about your own drawing what you know darned well I'm going to tell you about it," but it makes her see the point as nothing else could, and usually she comes back with intelligent criticism twice as helpful to her as if you had made it instead. Another thing that helps the artist is to listen to *himself* as he criticizes other people's work and tell himself about his own work the same things he tells himself about other people's.

Mr. Willing told me recently about a youngster showing him some sketches and Mr. Willing asked him with reference to one in particular to tell him honestly if he believed it was a good drawing. "No, sir," said the student, "but I thought you might."

Using your own eyes and your own mind, however, is hard work, and the human animal is lazy. One of the other things the art man has to deal with in giving out specifications is the young artist who insists on all the limitations he can get you to name. The kind of pen; the weight of cardboard, the method of mounting, and the precise number of spots on the hide of the yet uncreated giraffe—they ask you these things with an earnestness that would be funny if it weren't so pathetic.

One of the chief things they demand specifications about is the mechanical requirements of reproduction. Most of you know a good deal about all the processes of reproduction. Probably some of you know about as much as the woman who asked an artist of mine whether he drew or painted his pictures first.

Knowledge of inks, and methods of printing, however, do not affect the artist at work on his design to any great extent. For the average design to be reproduced in either lithographic or process plates, he can choose and mix his colors with pretty nearly the reckless abandon with which nature scatters her own.

Full strength, half intensity, or neutral value of any one of the primary colors or derivatives by combinations of primary colors, any grayed colors or ttnts and shades, are capable of facsimile reproduction.

There are really only two important things to keep in mind. First that in engraving and printing only one primary blue is used, therefore the design

will be difficult to reproduce, and perhaps incapable of being reproduced with exactness, if shades of blues and greens and violets are introduced that require *different primary blues*. This applies to the other primary colors also. However, from the fullest intensity to the lightest tone of these three primary colors and their combinations there are 82 different colors from which to choose.

It is also difficult to reproduce values that are produced by mixing white with color.

Standard textbooks on color, however, show the primary colors on which are based the three and four-color processes; or one may get a set of "progressive proofs" from any engraver showing the process red, the process blue, and the process yellow employed.

Many of the most interesting color combinations, however, can be produced more successfully thru the use of the flat tint line cut, the wood block, or the linoleum block, printed from special inks in flat colors. In preparing work for reproduction in this way, the artist must use the exact color he wishes reproduced, the exact number of colors that are to be printed, and plan his design to show the full strength of the color everywhere. When line cuts are used, grains or tints may be achieved thru the Ben Day process, or by overprinting one color on another.

These things, however, are comparatively minor, as I have said before. If the artist will concentrate on producing the best piece of work of which he is capable, the reproduction of it will take care of itself.

Far more important is the knowledge of his craft, the patience to devote to a commercial problem the same care, thought, energy and brains that he would put on an academic problem, and the understanding of the intimate relation of industry and art.

The inherent selling value of the poster, after all, is the great thing to consider, because unless the poster sells the goods, creates the desire to buy or the impulse to act it is not accomplishing the purpose for which it was made. That has always been my quarrel with the German posters, which some time since had such a vogue. They might be interesting in color values, beautiful in mechanical workmanship, arresting to the eye of the artist; but they did not illustrate the thing they were advertising, and to my mind failed to create the desire to buy or the impulse to act on their suggestion.

One of the most common errors in poster-making is an attempt to spread the appeal of the poster over too wide a group of beholders to reach every age, class, sex, mood, taste,—and pocketbook. The advertisement that sells a perfume must appeal to women, and arouse a desire to breathe the particular scent you are trying to merchandise. Velvet Joe tobacco advertising is intended to reach a group of men of particular tastes; Pall Mall cigarets another.

Another common difficulty is the lack of a center of interest—a bull's-eye, so to speak. A simple test of a good poster is to cast your eye quickly over it and see if you can get the idea behind it at a glance, without having to wander over the surface of the entire drawing, pausing here and there to pick up a salient detail. This does not mean that the center of interest must occupy any precise spot on the page. Some time since several wise advertising men produced the theory that any poster to produce good advertising results must be designed within a circle. It has been proven that such a limitation is not necessary—that a drawing may be symmetrical or asymmetrical, and still be a good poster, according to the excellence of the idea and the success of its execution.

Mr. Frank Lord, director of advertising for the DuPont de Nemours Company, recently said that the war has taught us that *preparedness* is the longest and strongest word in the dictionary. I would suggest that equally as long and strong is the word co-operation. Vitally important is the co-operation between theory and practice; between art and utility. Now, as never before, we must all work together, one trade co-operating with its sister craft and sister profession; manufacturer co-operating with artist and the consuming public with the trade. The artist's finished product must be modified to the modified taste and the modified means of the public, and *of* greater and more obvious practical value in every way. This is not a preference; it is a necessity.

War conditions are only an intensified example of the constant flux and change in public opinion and public buying power, in public taste and public approval which the skillful artist must constantly watch. There are positive waves of feeling and preference easily noted when you are watching for them. Do you remember, for example, the Charles Dana Gibson furore? The epidemic of round medallions on magazine covers a few years ago. The yards of roses and yards of kittens and yards of puppies that adorned perfectly respectable parlors in our youth? The passion for red-haired women rampant that even now is hardly dying away? The entire rise, fever heat, and slow relapse of the eccentric school of drawing? Who remembers now the head of Mademoiselle Pogany, so long flung about from one newspaper funny column to another. The once-famous Nude has descended the staircase into oblivion.

Constantly the artist must keep in touch with all these various phases and crazes of art, use what is good, reject what is bad, and keep in step with the movement all the time. Constantly he must keep readjusting his sliding scale of what the public wants and will pay for today, what it will demand tomorrow, and what it would have if it only knew what to ask for. Besides these things, the matter of reproduction is relatively unimportant.

Arnold Bennett puts a shrewd bit of dialog into

the mouth of the celebrated publisher and his artist brother who form the leading characters in his play, "What the Public Wants."

"You keep on giving the public what it wants just as long as you can," says Francis to the great Sir Charles. "That's your mission in life. Only, prepare for the rainy day."

"What rainy day?" demands Sir Charles.

"The day when the public wants something better than you can give it."

An Experimentation in Vocational Guidance and Placement

A Bureau Supported by the North Bennet Street Industrial School
George C. Greener, Director

(Conclusion)

Continuation Classes.

In connection with all of its follow-up work, the bureau looks forward to the time when the compulsory continuation classes shall claim eight hours of the week of every worker under 18. This scheme is at present being strongly urged in England as a primary reform to be undertaken after the war. The final report of the House of Commons departmental committee on juvenile education recommends that early legislation shall be adopted "to require attendance for not less than eight hours a week, or 320 hours a year, at day continuation classes between the ages of 14 and 18."

Vocational Psychology.

So far as it is practicable, the children should be classified according to their ability, as they are in the London Juvenile Exchange. This cannot, of course, be attempted in too refined a scale, but where the intelligence-level of a particular child is either very high or very low, the counsellor should be in possession of the fact as early as possible in order to proceed efficiently. The school record is an excellent guide in discovering the children of these two extreme types. In the public schools of the cities, feeble-minded children are coming more and more to be cared for in special classes. This is of great help to the vocational counsellor, who, unless the school has already done the work of differentiating these pupils, may lose much time on an individual case of this type. "The mentally incompetent," says Professor H. L. Hollingsworth, "can easily be discovered at an early age by the use of the graded intelligence scales. Their subsequent direction into forms of useful work appropriate to their degree of defect is not a psychological enterprise, but, rather, a civic obligation and industrial economy." An illustration of this problem, which every employment bureau must meet from time to time, was that of a feeble-minded youth of 17 placed by the North Bennet Street Bureau. This boy, who was quiet and willing to work, was placed in a small shop at a simple mechanical task of an individual nature. When employed with discrimination at types of work which require neither competition nor co-operation, such workers may lead useful and productive lives.

In his book on "Vocational Psychology," quoted above, Professor H. L. Hollingsworth emphasizes the importance of character as distinguished from intelligence in influencing the careers of the great bulk of the workers. "In the proposals to direct individuals into their proper life careers," he writes, "the advocates have quite commonly failed to make sufficient allowance for the overwhelming importance of incentive, motive, attitude and purpose and the large role they play in determining the possible achievements of a nervous system. It is well enough to test the memory span, attention type, and reaction time of an applicant for a job as motorman on a street car. It is still more important to learn the strength of his instinctive competitive reactions, to measure the degree of his belief in hell or in socialism, or the firmness of his intention to effect the higher education of his children. By 'more important' I mean better calculated to reveal his fitness for the work. I would rather trust my life and limb to a motorman whose feeble memory span is re-enforced by a loyal devotion to the comfort of his grandmother than to a mnemonic prodigy whose chief actuating motive in life is to be a 'good fellow.'

"These comments should not be construed as an under-estimation of the usefulness of the simple intellectual test as a preliminary precaution in engaging employees or in detecting extreme departures from the mode or average. The use of such tests in discovering such departures and variants as idiocy, imbecility, and general stupidity has been amply justified by experience with them. But we are primarily concerned here with the determination of individual differences and qualifications within the large middle range of the curve of distribution." "But the degree to which one *cares*,"—as the author says in another place, "is not measured by reaction time or cancellation tests."[6]

New Occupations Needed.

The range of occupations open to children is comparatively limited, but within this limited range there is still room for choice, wise or unwise. Let us acknowledge that the social ideal would be to keep all children in school until eighteen; but until that ideal can be attained, our efforts must be concentrated on the improvement of adolescent occupations. One source of evil conditions is the intense competition among child workers. This can only be relieved by increasing the number of placements in school, at the one end, and by increasing the variety of available occupations at the other end. The vocational counsellor needs to be constantly on the alert to find

[6] pp. 216, 217, 220.

new possibilities in the industrial world. This is especially necessary for the girls, who are more restricted than the boys in this respect.

A typical month of placements by the North Bennet Street Bureau comprises the following for boys: machine shop, shoe shop, printing shop, mattress factory, dress factory, sheetmetal factory, book-binding shop, cork factory, paper ruling office, leather counter factory, and engraving office. A typical month of placements for girls comprises the following: power-machine factory, dress-makers' apprentices, shoe factory, shoe findings factory, box factory, jewelry factory, curtain factory, department store, and clerical work. The outlook in a number of the positions included is far from being as encouraging as the bureau would desire, and that is likely to be the case with every similar agency in every community.

Qualifications of Director.

The difficulty of finding directors, secretaries, or agents suited for vocational guidance work is a real one and can be overcome only by the most careful individual selection at the present time. Training schools for social workers of this type are needed, for the public schools have hesitated to provide such training on account of the expense.

The qualifications of the director are extensive. He must be familiar with conditions in the public schools and must know about conditions in industry. It is very desirable that he should have had some experience as a worker in industry. If without such experience, he should be vicarious enough to realize the problems of the industrial worker and to appreciate what he has to meet and contend with.

In our efforts to standardize industrial conditions, we are prone to overlook the extent to which human relations enter into and complicate commercial relations. The vocational counsellor must not overlook this factor in his work, and he must have tact and diplomacy to handle personal differences. His personality must be of the kind that seeks to mitigate the hurt feelings, wounded pride, and jealousy of authority which regularly enter into the day's work. He is dealing with youthful workers, of whom judgment and wisdom cannot be predicated, and he must be prepared to step in with personal ambition whenever it is needed.

A typical situation of this kind arose in the case of a boy placed in the printing trade. John had been graduated from the prevocational class of the grammar school and had wished to enter this trade. His teachers and parents approved of his choice and John was placed in a printing house of excellent standards. He reported very good progress to the counsellor and his employer did likewise. Then the employer notified the counsellor that the boy had left and had gone to work at a fruit stand. A conference with him brought out the fact that he had spoiled some work, for which the employer had reprimanded him by saying, "You'd make a good errand boy." The offended youth had given up his place at once, and was now working eleven hours a day at a low-grade employment. The interview further revealed that he had not been getting as much money as he thought he should have. The employer told the counsellor that he had perhaps been too severe and further, that the boy was worth two dollars a week more than he had been getting. In the end, the boy went back to his work, better paid, a little wiser, and probably more valuable to his employer. In this instance, the intercession of a third person was needed both by the boy and his employer.

The Advisory Committee.

The bureau was organized with an advisory committee to supervise the work. In order that the scope of the work might be broad as possible, the committee was formed by representatives from a number of organizations. It includes members of the board of directors of the North Bennet Street School, the head masters of the Eliot and Hancock Schools, the director and counsellor of the Boston Placement Bureau, the director of the manual arts department of the city of Boston, the head of the prevocational classes of the city, and employers of juvenile labor. The advisory committee holds monthly meetings with the director of the school and the two vocational counsellors. At these meetings, reports of the work are made and suggestions concerning its execution are discussed.

Records.

In the keeping of records, two essential points should be observed: first, that the number of record cards should be kept as small as possible, and, second, that the information recorded should be regarded as confidential and for the use of the placements secretaries only. The forms on page 86 are in use by the North Bennet Street Bureau.

Some Typical Cases.

The group of cases given below illustrate the kind of need which the North Bennet Street Placement work was designed to meet and the steps taken to meet the need in individual cases. Needless to say, not all the cases were equally successful. The instance given above of the youth returned to work under improved conditions and a better understanding with his employer is not, of course, uniformly representative of the cases. Some young clients will see in the resources of the placement bureau only an added reason for leaving their jobs and changing their occupations more frequently than they would otherwise do. This must be guarded against by the trained vocational counsellor. The following cases are comparable to those existing in any similar community of wage-earning families.

John Rizzo, one of our club boys, gave up his work in the shoe factory, thinking he had got to the end of his opportunities there and was not able to make more than $11 or $12 a week. He had taken the

NAME OF FIRM ____ Industry ____
Address ____ Product ____
Employment Manager ____

Kinds of Work	No.	Sex	Age	Weekly Wages: Begin	Rate Inc.	Max.	Time work	Piece work	Position: Sit	Stand	Remarks: Dangers

EMPLOYERS: No. over 21: Men ____ Women ____ Under 21: Boys ____ Girls ____ Total ____
WORKERS DESIRED: Minimum Age ____ Schooling ____ Other Qualifications ____
Immigrants ____ Negroes ____ Paroled Boys and Girls ____ Physically Handicapped ____ Probationers ____
SEASONS: Rush ____ Maximum Force ____ Dull ____ Minimum Force ____
HOURS: Begin ____ A. M. End ____ P. M. Saturday ____ P. M. Noon ____ Variation ____
PHYSICAL CONDITIONS: Type Building ____ Light ____ Ventilation ____
Space ____ Cleanliness ____ Lunch Facilities ____
Fire Protection ____ Rest Room ____
OPPORTUNITIES FOR ADVANCEMENT ____
Co-operation with Placement Bureau ____
Present Wants ____
Date ____ Reported by ____

Form 3. Firm Schedule. Placement Bureau.

Record of Firms with whom Pupils are placed.

1 2 3 4 5 6 7 8 9 10 11 12

Date ____ School ____
Sent by ____
NAME ____ Address ____ Floor ____
Sex ____ Color ____ Date of Birth ____ Birthplace ____ Years in U.S. ____
PHYSICAL CHARACTERISTICS: Weight ____ Height ____ Neatness ____
Special physical defects ____
Remarks ____

SCHOOL RECORD: Date of leaving school ____ Grade on leaving ____ Teacher's name ____
Conduct ____ Times present ____ Times absent ____ Cause of absence ____ Times tardy ____
Arithmetic ____ English ____ Geography ____ Reading ____ History ____ Grammar ____ Music ____ Spelling ____
Drawing ____ Manual training ____ Sewing ____ Cooking ____ Penmanship ____ Science ____ Physical training ____ Physiology ____
HIGH SCHOOL SUBJECTS: Course ____
English ____ History ____ Foreign language ____ Mathematics ____ Science ____ Clerical Arts ____ Domestic Arts ____
Special talents ____

GENERAL CHARACTERISTICS: ___ Reliable ___ Industrious ___ Obedient ___ Cheerful ___ Courteous ___ Has pupil initiative ?
Remarks ____

Has pupil indicated any interest which should assist in the selection of an occupation? ____
If so, what interest? ____ What occupation ? ____
Do you as { Vocational Counsellor / Teacher } think this interest should be encouraged ? ____ Parents' preference for child's work ? ____
Previous work record ____

Students' Record. The reverse contains additional information concerning family and occupations.

INDUSTRIAL RECORD
NAME ____ ADDRESS ____

No. of the position	Date entered	Date left	Time idle	Time empl'd	Wages: First	Last	Occupation	Industry	Employer	Hours	How Secured	Reasons for Leaving: Child's	Employer's

North Bennet Street Industrial School ____ Recorded by ____ Date ____

Record of Children's Industrial Experiences.

job a few years ago in order to make more money than he would have made if he had started in a better place at less money. He felt, however, that he would be willing to begin all over again even tho he was considerably older than the average boy to begin. He was placed with a plow manufacturing company at South Framingham, at $17.50 a week.

Yetta is a bright Jewish girl who graduated from prevocational class in June, 1916. After helping in her mother's boarding house during the summer vacation, Yetta went seeking a job. She brought news of at least three low grade places which the counsellor advised her not to take. Counsellor placed her in very high grade florist's store where she became office helper. Did splendidly at first and then became careless. On being reprimanded, she remained at home and sent a note resigning her position, as she "didn't wish to be fired." Counsellor visited home and store. Employer gave Yetta another trial, the counsellor asking that any difficulty with her be reported at once. A couple of months later, on being reprimanded, Yetta again left and sent in her resignation. The employer came down to talk over the matter with the counsellor and also visited the home. This cleared up the view of the situation as presented by Yetta to her family. Employer took Yetta back and placed her under the direct supervision of a man who had charge of the office. After several weeks Yetta became careless, mixing the files so that another girl had to do the work over. Likewise she had been reported as being very negligent in continuation school. The counsellor decided that Yetta's older brother ought to meet her superintendent. This was done and Yetta is now doing well.

Margaret, on graduating from the North Bennet Industrial School, entered a cheap jewelry factory. Dissatisfied, she left and entered a candy factory where she earned $4 a week. Being bright she soon saw there was no future and entered the power-machine operating class at North Bennet Street Industrial School at an entering wage of $2. After six months' training, she was placed in a curtain factory at $6 a week. Now after a year she is earning in this same place from $10 to $11 a week. She is just sixteen.

Marie, a very nice 14-year-old girl, was placed with a milliner who paid her first $3 a week. Next season she received $4 and in December was promised $4.50 to pay her carfare, as she had been ill. She was also promised $5.50 in March when season became busy. Parents wanted the $5.50 at once. The employer, who liked Marie very much, said she could not afford to raise until business was better. Marie was very anxious to continue at trade as she was doing nicely. Counsellor tried to influence parents to allow Marie's return to the millinery work, but they insisted on her

entering shoe factory. She is still there and apparently in poor physical condition. Brother already is consumptive.

James, twenty years old, was working in a candy factory and earning $8.50 to $9 a week. He had been attending evening classes in woodworking for the last three years. He wishes to get into the woodworking trade. He was placed with a woodworking concern, in charge of one of the machines at $9 a week.

Angelina, a 15-year-old rather stupid girl, started work in a laundry during her vacation. In September, she left and complained to counsellor of working 10½ hours a day. Counsellor took her to the children's hospital to apply for place in out-patient room. The work was to be simple, consisting of registering children, undressing the babies, and in some cases taking their temperature. It required steadiness rather than brilliancy. Angelina was offered the place at $20 a month and her lunches. Her father refused to let her go so far away from home, a 25-minute ride, and placed her in his market. Here she stayed a few weeks and again returned to counsellor. Was placed in curtain factory folding. Left in two days because she worked about 8¼ hours. This could have been readjusted. Placed herself for a few days in an embroidery place. Since leaving there has been loafing.

Rose, a small 16-year-old girl, placed in a women's specialty shop, stayed there almost a year before any suspicions were aroused as to her honesty. On investigation, it was discovered she had stolen over $50 worth of goods. She emphatically denied this both to the owner and to the police. The employment manager, a woman, succeeded in getting the truth from her and she was allowed to settle the matter in small payments. Rose lost her position but the employment manager still has the girl come to see her and is willing to try another girl.

Francesca, an excellent sewer, graduated from North Bennet Street Industrial School in June, 1916. Was immediately placed by her family in shoe factory because sister worked there. Did menial work and some stitching, earning a weekly wage of $4. Counsellor offered her a place in an embroidery shop with wage of $5, but no carfare. Family refused on account of pay. Mother said, "She can go with her sister and if one doesn't act good the other can tell." In September the counsellor offered her a place with a dressmaker as errand girl and apprentice with wage of $5. Mother now says, "Francesca may go, for I know it's a nice place if you offer it." Doing very well. Francesca says, "I'm so glad to be here; I'll never go back to the shoe shop again; I'm learning something here."

Henry is a 14-year-old boy, who will leave school in a month or so to begin work. He seems brighter and keener and more earnest than the average boy. Yet when he was asked what line of work he would choose if he could enter the one he desired most, his answer was that he did not know of many kinds of work and so could not choose. He has taken up woodworking and machinist work in his school and his father is a tailor. These trades do not interest him and he knows of no others. In a month he must make his choice. The counsellor has suggested many possibilities and the boy may hit upon the one that fits him best. His case illustrates the need of bringing the wide and varied possibilities of work to children's attention during their school life.

Thomas, 18 years of age, had spent several years at the North Bennet Street School. He seemed better fitted for mercantile work than for trade and was placed with a firm to learn the wholesale business. His employer has since written to the counsellor to say that, if the bureau has any more boys of Thomas' type, we may send them to him.

Conclusions.

The results of the two years' work done by the Vocational Guidance and Placement Bureau have been manifold. Hundreds of boys and girls have come to the vocational counsellors, many of whom had worked before. The average wage of these young workers before placement was less by two to four dollars than after placement. There was a definite increase in their stability after placement. They have learned to give notice before leaving a position. They have shown increased willingness to arbitrate their differences with the employer. They have gained a greater desire to have work in which there is a future and to prepare themselves for it. Their interest in education beyond the grades in both day and evening schools has been stimulated. All of these improvements carry with them increased self-respect and greater responsibility in the young individuals.

There is a tendency to measure the cost of vocational guidance work on a per capita basis; to regard the number of boys and girls actually placed during the month as the sum total of the bureau's achievements. But this is a misleading attitude toward work which is essentially a means and method of conservation. The young people who come to the bureau receive advice which they can use in further stages of their careers and the counsel given them may bear its best results a long time hence in a form of which the bureau has no record and no knowledge.

The importance of agencies and institutions which can do this experimental work was never so great as it is today. The war, and the industrial conditions which follow the war, have raised many new problems in the conservation of the juvenile citizen whose solution cannot be postponed. There will be dislocations in industry due to the replacement of men by women, the substitution of juvenile workers for adults, and the over-growth of certain trades attended by the decline of others. This means swiftly changing conditions in industry which few can forecast beyond the morrow and still fewer beyond the year. The helplessness of adolescent workers in this era of reorganization will be greater than ever before. Only as social protection in the form of vocational guidance and placement work is forthcoming from the community will the citizens of tomorrow be receiving their due.

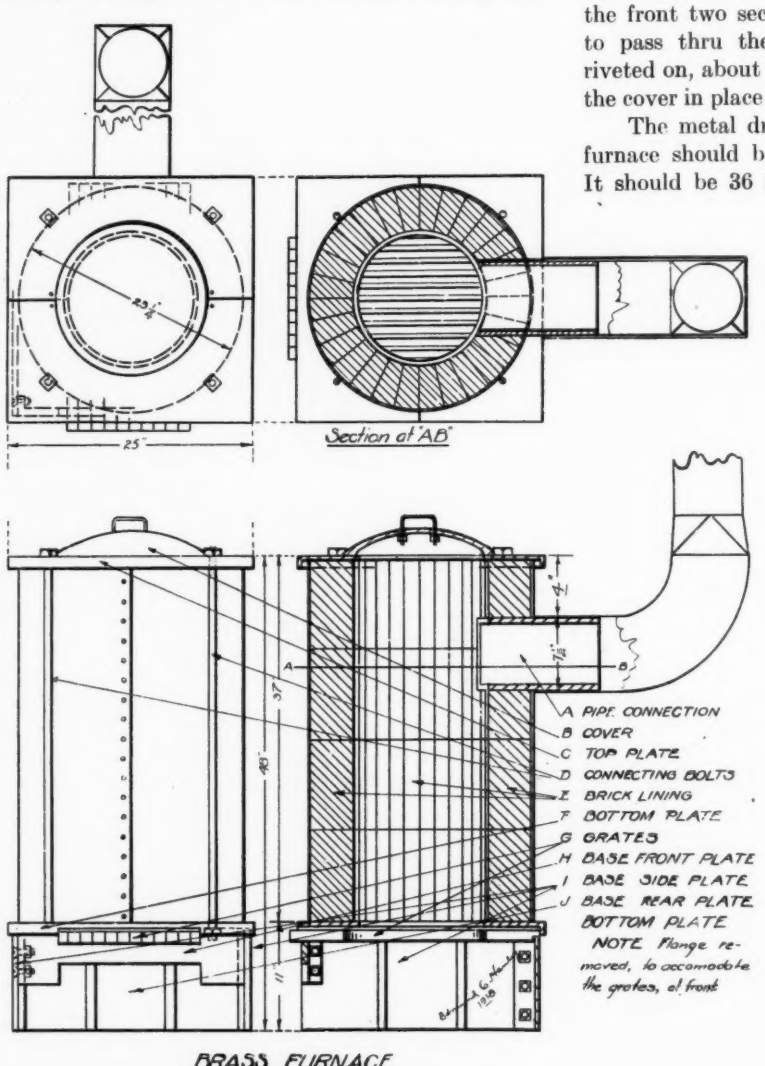
THE BRASS FURNACE

Edmund C. Hanley, Muskegon, Mich.

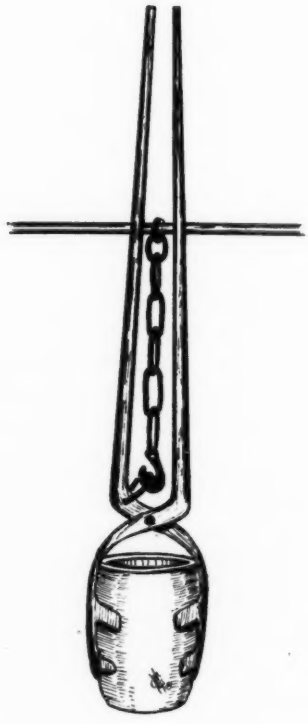
IN these days of great world progress the study of metal has become one of great importance, and that importance should not be overlooked in connection with the study of pattern-making and foundry work. To properly accomplish this end I believe that many schools in the country ought to have, and keep in constant use, at least, a brass furnace. On the other hand the interest taken in and the benefit derived from such an investment in the pattern shop will be greatly increased if the student has the opportunity actually to produce for himself metal castings. Again, such a furnace is practical, as in most cases it will produce sufficient heat to melt iron. Many an item of expense may be saved the school in the way of repairs, building equipment, etc., not to mention the convenience of being able to turn out work at a moment's notice.

There are two things to be considered before undertaking to build such a furnace. Is the school chimney high enough to produce sufficient draft and, secondly, will there be enough room about the furnace conveniently to carry on the work? The pit in which the furnace is to be located should be at least five feet away from the wall and the same amount or more on each side. The pit should be about 30″ in depth and lined with brick. The cover for the pit, which is built in three sections, should be made of number three gauge sheet iron. Numerous holes about one and one-half inches in diameter should be drilled in the front two sections to allow a free passage of air to pass thru the furnace. Angle irons should be riveted on, about two inches in from the edge, to hold the cover in place on the pit, as shown on the drawing.

The metal drum that surrounds the wall of the furnace should be ordered from some boiler works. It should be 36 inches in height and 23¼ inches in



Assembly of Brass Furnace.



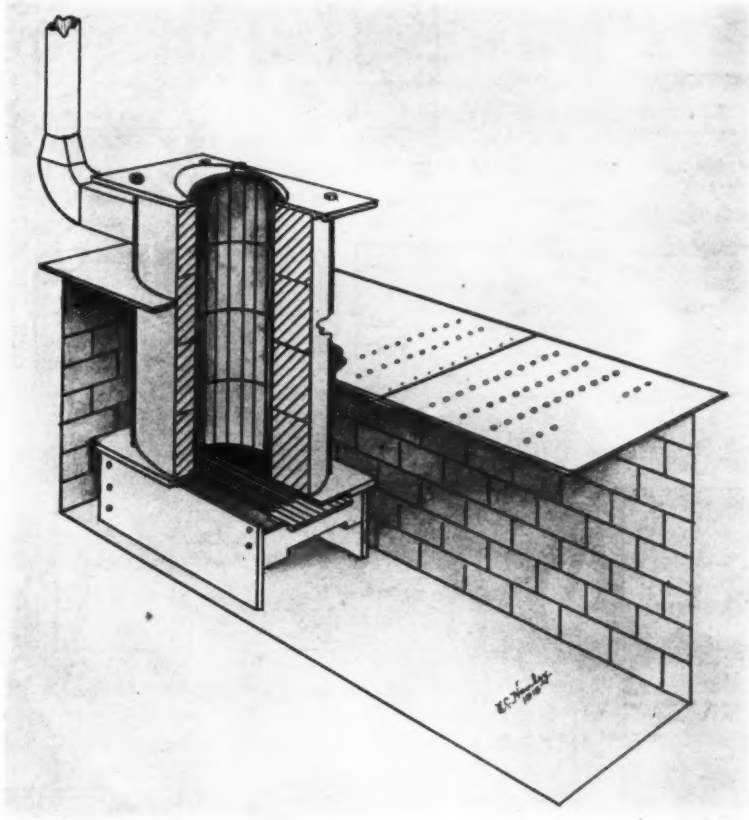
The Crucible.

diameter. The seam will come to the front, with rivets about two inches apart. At the rear three and a half inches from the top there will have to be a seven and one-half inch square opening, to accommodate the pipe connection.

The fire brick, which must be ordered "special" from the dealer, are wedge shape and should fit snugly together. Specifications will be found on the assembly drawing. The patterns for the castings are all simple in construction and I believe can be built in any school shop. Use good, dry lumber and take every precaution against warping. It is not necessary to machine the castings, but should it be desired, finish marks will be found on the drawings. The top plate, patterns "C," may also be used for the bottom plates except that the lugs will not be needed and about 14½ inches of the front flange will have to be removed to allow the entrance of the grate bars. This can be accomplished by filling in these parts with moulding sand after the pattern has been withdrawn from the sand. To get a satisfactory pipe connection casting it will be necessary to prepare a core box and core out the inside.

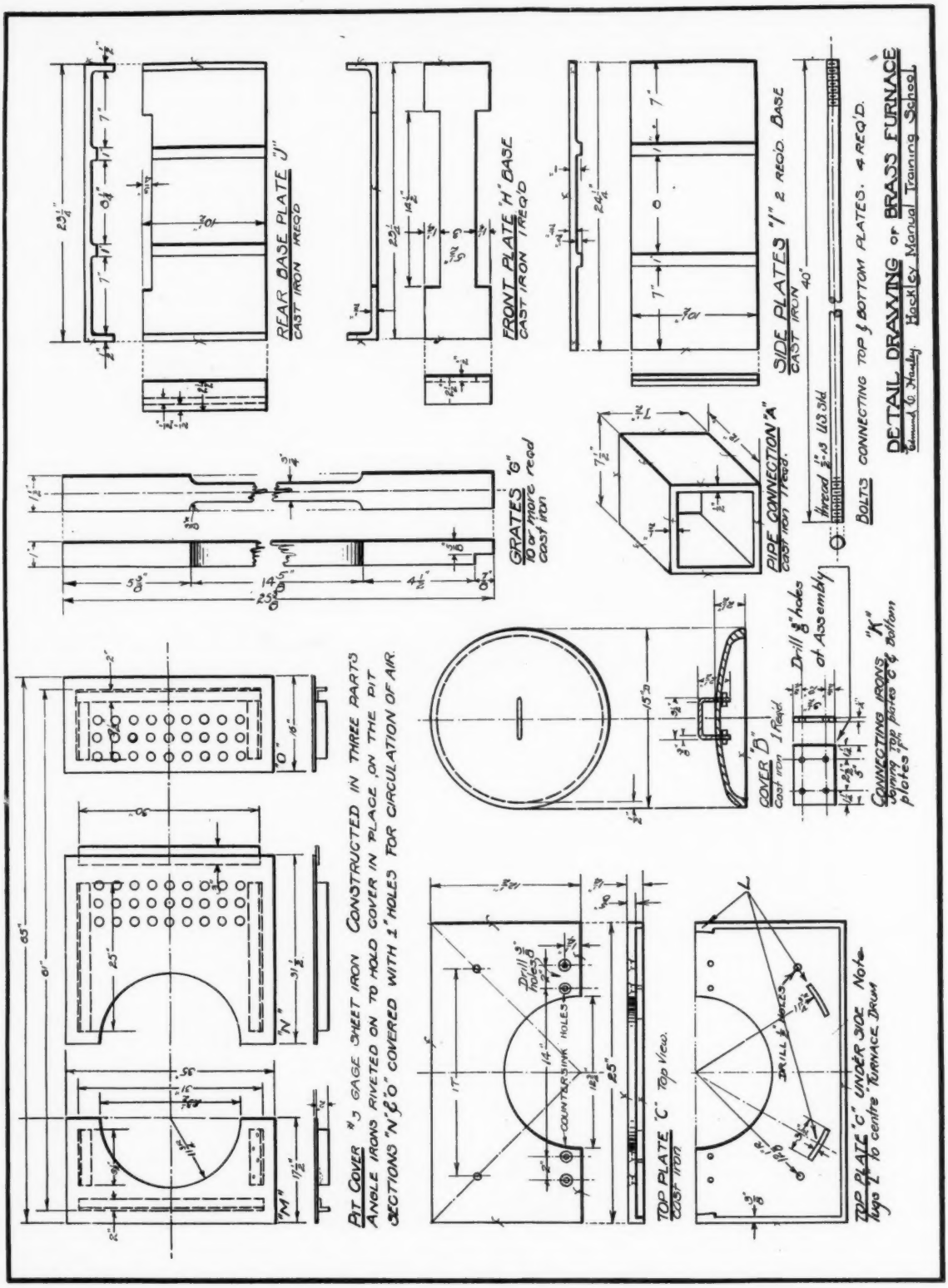
There should be no trouble in assembling the parts if the "assembly drawing" is carefully followed. Before bolting on the top plate it will be necessary to line the drum with fire brick. In laying the third and top layer, care will have to be taken in fitting the brick around the pipe connection. Before placing the top plate, a layer of fire clay will be necessary to make a tight or snug connection. Have a tinsmith prepare a good, strong elbow of galvanized iron to connect to pipe leading to the chimney.

If the drawing has been carried out and assembled to the last detail the furnace will now be ready for use. Before we can carry out a heat we will need other apparatus. In the meantime, order in several No. 30 crucibles and a pair of "tongs" and "shanks" to fit this size of crucible. The names of manufacturers of any of these products may be found in any foundry magazine.



SECTIONAL PERSPECTIVE OF BRASS FURNACE

To start the fire see that the grates are properly in place. Use some old newspapers and some kindling wood and ignite. After the fire has a good start throw on two scuttles of foundry coke. It will be necessary to order the best possible lump foundry coke. Do not order the crushed, but crush the lump yourself to get best results. While the coke is getting a start prepare the pot; that is, if it is to be brass weigh in the copper and throw on some charcoal. Now set the pot down in the furnace and pack coke around it. (If the crucible is new and has never been tempered it will be necessary to start with a slow fire; that is, get the pot in as soon as you are sure the coke has a


DETAIL DRAWING OF BRASS FURNACE
Samuel G. Hockley Hackley Manual Training School
REAR BASE PLATE "J"
CAST IRON REQ'D
FRONT PLATE "H" BASE
CAST IRON 1 REQ'D
SIDE PLATES "I" 2 REQ'D. BASE
CAST IRON
BOLTS CONNECTING TOP & BOTTOM PLATES. 4 REQ'D.
GRATES "G"
10 or more reqd
cast iron
PIPE CONNECTION "A"
CAST IRON 1 REQ'D.
COVER "D" 1 Reqd
Cast iron
Drill 8" holes at Assembly
CONNECTING IRONS "K"
Joining top plates "C" & bottom
PIT COVER #9 GAGE SHEET IRON CONSTRUCTED IN THREE PARTS
ANGLE IRONS RIVETED ON TO HOLD COVER IN PLACE ON THE PIT
SECTIONS "N" & "O" COVERED WITH 1" HOLES FOR CIRCULATION OF AIR
TOP PLATE "C" Top View.
CAST IRON
TOP PLATE "C" UNDER SIDE Note lugs 1" to centre FURNACE DRUM

start and add coke as noted before. After the pot has been thru a heat it will be in a different condition than before. The foundryman would say that it has been "tempered.")

Your handling and running of the furnace will improve with time. Do not make the mistake of constantly looking in and poking at the coke. I would add, to the beginner, that the less you fool with

the furnace after the fire is going and the pot is set, the better and faster will be the results. When you notice the top of the furnace turning to a red heat then you will know your metal is at the melting point. When the copper has melted add the tin and zinc. Numerous brass formulas will be found in the "American Machinery Handbook" and others. The charcoal will prevent the zinc from passing off in fumes. Throw in a handful of "rosin" for a flux and stir well. Be careful, as the rosin will flame up with a powerful heat.

Now the pot is ready for hoisting. If the pot contains only a few pounds it may be lifted out with a pair of long-handled pincers that ought to be included in the equipment. Later you will be melting a pot full of iron, seventy pounds or more, and the job of hoisting is no fun unless it is gone after in a systematic manner. Prepare a bar with two feet of chain and a hook attached, as shown in the illustration. There will also be needed an eye on the tongs to catch the hook. Now after the pot has been loosened from the coke bed and room has been made, drop in the tongs with chain attached. A boy will be needed at each end of the bar to do the hoisting, while the man at the tongs will only have to guide it out and set it in the shank. Near at hand should be a sand bed, say three feet square and five inches deep. Here they will carry the pot to do the skimming. Prepare a skimming rod from a bar of iron about one inch wide, one-fourth inch thick and about four feet long. Bend it slightly round at the skimming end. While pouring, keep the skimming rod near the front of the pot and hold steady. We shall need a boy with a long hook at the back to keep the pot from dropping out of the shank as we near the end of the supply of metal. Also have a few boys handy with shovels of sand to throw on any moulds that should leak.

After the furnace cools withdraw the grates and from above, with a long iron bar, poke out the remaining ashes that will have caked over the grates.

If the brass heat proves successful fill a pot with iron scraps and proceed as before, only have the pot well covered with coke before you put on the cover and let her go. In about an hour and a half or two hours after the fire has been started with good coke a pot full of iron can be brought to a white heat. If the iron melts successfully I would order in a few hundred pounds of pig iron. After the pot has been filled with scrap and sprues and placed in the furnace, on top of this the writer sets a pig or two and holds it in place with coke. If carefully placed, it will run down into the pot as it melts.

It is my impression that the furnace improves with age, and that the continual cleaning and poking around after a heat will increase the size to advantage at the melting zone. If fire does not draw properly it may be that opening a window or a door will help materially.

UNIFORM GRADUATING DRESSES

Janet G. Cation and Rosamond C. Cook, Iowa State College, Ames, Ia.

A GIRL who worked her way thru high school could not afford a graduating dress, and appeared last June on Commencement day in a black skirt and pink waist. Other young people more sensitive to the opinions of their classmates, and less determined in their nature have been known to leave school before graduation. A mother recently related that her son was spending thirty-five dollars for a new suit, and she knew that the girls in the class expected to spend more than that for their dresses. With the price of dress materials still at a high ebb, many parents, altho not admitting it publicly, are wondering how they are going to meet any added expense this year; on the other hand they do not want their daughters to be conspicuous by what they do not have at this great epoch in their lives.

Does this not give the home economics teachers an opportunity to meet a real need in the lives of both parent and children? If she is putting the stress on the clothing budget that she should, she is emphasizing the fact that no more than twenty per cent of the income should be spent for clothing by the entire family. With this fact in mind, the teacher has an opportunity for influencing the pupils toward a sensible outfit from the economical standpoint. Just as important is the necessity for guidance along the line of suitability for the occasion. In every class one finds girls who can afford, and do buy, in excess of what the occasion demands. They need direction even more than those in moderate circumstances.

Uniformity seems to be the one solution of the problem. This may be carried out in one of two ways. One school may agree on a uniform design, while another may prefer a uniform price. In schools where graduating dresses have been made the eighth-grade pupils especially like the uniform design because it distinguishes them and their school.

If the uniform design is chosen several styles might be equally good, for example, a simple one-piece dress or a middy blouse and skirt.

Illustration 1 shows the uniform which one eighth-grade class made last year. The prices ranged from $1.50 to $2.50, depending on the size of the girl. Indianhead or American suiting ranging in price from thirty to forty cents per yard was used. A tie of the class color costing fifty cents, completed the costume.

Illustration 1.

High school girls often prefer uniformity of price rather than design in order that they may have a greater opportunity of expressing their individuality.

Illustration 2 shows a dress costing $2.00. It was made to demonstrate the fact that even with the prevailing high prices a suitable dress could be made for so reasonable a sum that every girl could afford to have one. Even the girl with the black skirt and pink waist might have had such a dress if she had known that such was possible. Flaxon at twenty-five cents per yard was used. The design was chosen as one which allowed for considerable variation if a high school class wished to use it.

Illustration 3, a dress made and worn by a high school girl cost $4.50. Many people feel that lace and embroidery are necessary adjuncts to a lingerie dress. The picture shows that a charming dress of a fine material like organdie may be made without this added expense. There is not only a valuable experience for the girl in the making of her dress, but also a decided cash consideration, which should not be overlooked. This dress could not be duplicated in a ready-made dress under eighteen dollars. (Illustration 4.) If the same dress had been made at home, no doubt a seamstress would have been employed adding several dollars to the total cost. Many times this expense is not anticipated nor added to the cost of the garment.

A girl must sometime begin to take responsibility for the selection of her clothing. Does this not seem an ideal time for her to begin? If she can make her dress, it will not only relieve the mother of the actual work of planning and the anxiety of making, but will also lessen the financial strain. This is especially true if the teacher and the girl will consider from the family income standpoint the amount that should be spent. If the income is twelve hundred dollars, no more than two hundred forty dollars of that amount should be spent for clothing for the family. In a typical family of five this would be about fifty dollars per person. Allowing for the additional needs of a high school girl, suppose she were given seventy dollars for her share. If this sum must provide for a year's clothing, what proportion should be used for her graduating expenses?

There will be girls in the class whose family income exceeds twelve hundred dollars, and who therefore

Illustration 2.

might wish a more elaborate outfit. Experience proves that these girls are usually the first to announce their readiness to do the thing that will be to the best interest of the class, and bring credit to the school.

Some teachers feel that lack of time makes such a problem impossible. The vital interest it provides, however, incites the girls to put forth their best efforts.

The number of lessons must be carefully planned by the teacher, also what she wishes accomplished in each. Illustration 1 was carried out by an eighth-grade class in fourteen lessons. These girls had had one year's sewing, and knew how to make seams and run the sewing machine. The flat iron and pins took the place of needle and basting thread wherever possible. The following outline shows what was done in each lesson:

Illustration 4.

Illustration 3.

1. Taking measures, altering patterns, laying patterns on material.
2. Cutting, basting plaits, stitching, basting yokes.
3. Stitching yokes to dress, stitching shoulder seams, basting front hems.
4. Cutting sleeves, cuffs, collars, belts.
5. Making cuffs, and stitching them to sleeve.
6. Basting and stitching sleeve in.
7. Underarm and sleeve seams.
8. Joining fronts and stitching.
9. Making collar.
10. Fitting for length, placing collars and belt.
11. Turning hem and stitching.
12. Finishing collar on dress.
13. Making belt.
14. Fasteners.

AGRICULTURAL DRAFTING

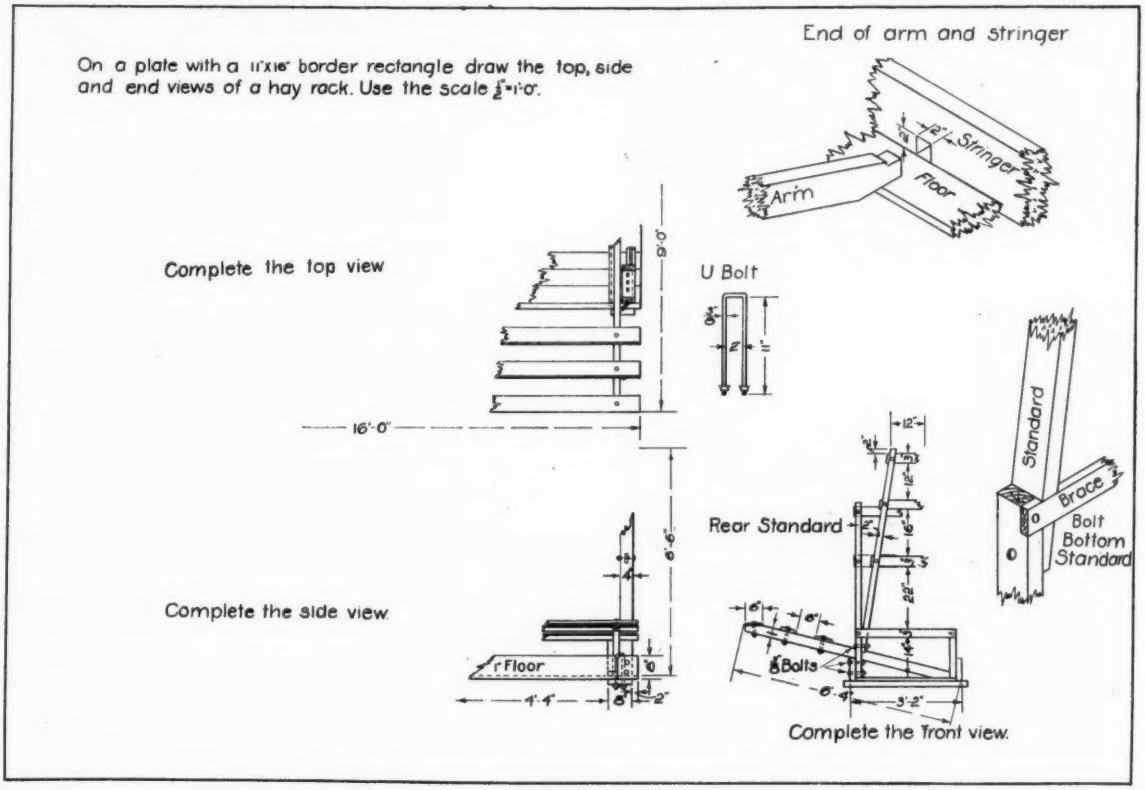
Louis M. Roehl, Cornell University, Ithaca, N. Y.

IT would seem that all boys of the seventh and eighth grades and all boys attending high schools who are from the country, as well as those boys from cities and smaller villages who have agricultural inclinations, might well pursue a course in agricultural drafting. That is, *agricultural* drafting as contrasted to machine drafting or no drafting in particular but just drafting as may in many instances be the case, so that the work shall have a direct helpful value on the career of those who pursue it.

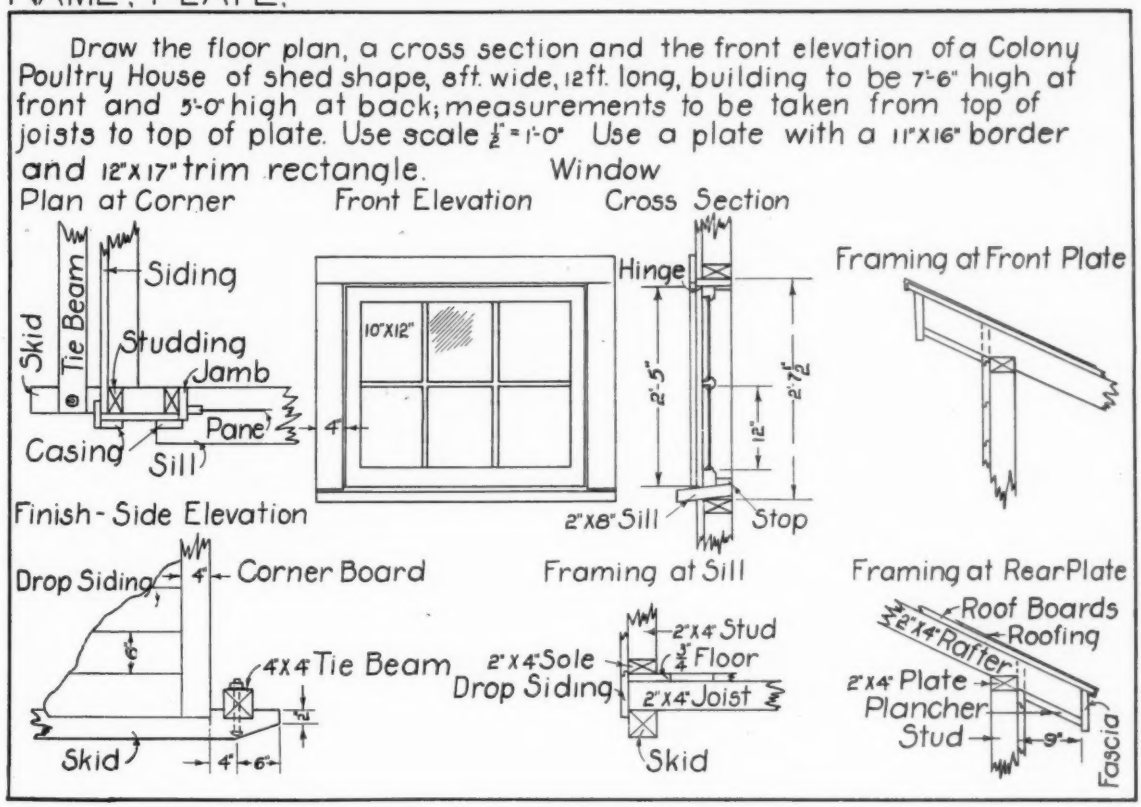
The question arises, "What shall constitute such a course and how shall it be taught?" By analysis we arrive at the following: Farm equipment may be divided into these classes: buildings, machinery, portable appliances, farm hand tools, carpentry, and metal working construction, and repair tools. The last named class has little or no relation to agricultural drawing as the making of most of them by a school boy is out of the question even tho he has a well executed drawing of any one of them. The farm hand tools such as spades, rakes, hoes, etc., are in a class with the repair and construction tools as far as the advisability of students making them is concerned. It would seem that a course in agricultural machine drawing might profitably be pursued. It might if the student is going to specialize in designing or manufacturing farm machinery or it might serve him if he chooses salesmanship of agricultural machinery as his career. But when we realize that we are aiming to make farmers of the young men in question, the machine drawing course appears hardly worth while. I dare say that the young man who has no knowledge of machine drawing will farm just as efficiently as he would had he spent valuable time on such a course. This leaves but two lines of equipment on our list: portable appliances and buildings.

I recently asked each member of a class of twenty boys to submit a list of such portable farm appliances as may be made by a farmer who has a kit of carpentry tools and a few simple metal working tools. The list contained 187 home-made appliances. It was made up of such articles as hayrack, wagon box, milking stool, saw-buck, road drag, bench, step-ladder, etc.

I made bold to make this statement, "Your work during your first term in drawing shall consist in learning how to make working drawings of these portable farm appliances. You should during this term of 54 sixty-minute periods complete at least fifteen working drawings and acquire sufficient knowledge of working drawings to make at your desire a working drawing of any one of the portable



TYPICAL PLATE USED BY AUTHOR IN TEACHING AGRICULTURAL DRAFTING.



TYPICAL PLATE USED IN TEACHING DRAFTING.

appliances." The interest in this work did not lag, for each boy was making a drawing of something he wanted to make and use.

A second term of 54 sixty-minute periods in agricultural drawing may well be spent in drawing the plans for a group of the following farm buildings:

1. Portable hog house.
2. Portable poultry house.
3. Corn crib.
4. Poultry house.
5. Implement shed.
6. Hog house.
7. Barn.

This requires eleven plates. Each building, excepting the barn, shall have three or four views, namely: (a) plan, (b) cross section, (c) end elevation, (d) side elevation. The barn shall have five plates, namely: (a) cross section of dairy barn, (b) floor plan, (c) second floor plan, (d) cross section and end framing, (e) side elevation.

The course shall not be a cut and dried one, wherein all students make each plate alike but only in so far as sizes of windows and doors and timbers, stalls and dimensions have by use become standard. That is to say, each student should suit the size of building to his particular needs. Thus when he finishes the course he will have a plan of the very barn and shed and poultry house he or his father wants for the farm.

Now we will consider the method of teaching. Let us take as a problem the making of a working drawing of a hay rack. There is certain information concerning the hay rack which in some way the teacher must convey to the students, particularly the construction, dimensions of all parts and their arrangement.

This information may be conveyed in one of several ways: (a) by verbal explanation, (b) by written directions on paper for each individual student, (c) by written directions on the blackboard, (d) by sketches on the blackboard, (e) by sketches on a large chart, (f) by drawing of parts of the finished article with dimensions, detail sketches and brief directions on a blueprint, a copy of which is to be given each student.

Concerning "(a)" it may be said that only a few of a class can grasp the meaning in full of what is being said and retain it. All those who do not grasp it must have the verbal explanation repeated. This becomes tiresome and monotonous to the instructor and to those who understand at first explanation. "(b)" Students usually do not enjoy getting directions from a literary sheet even tho the directions be plain. Pupils must enjoy a job before full measure of success can be assured. "(c)" Written directions on the

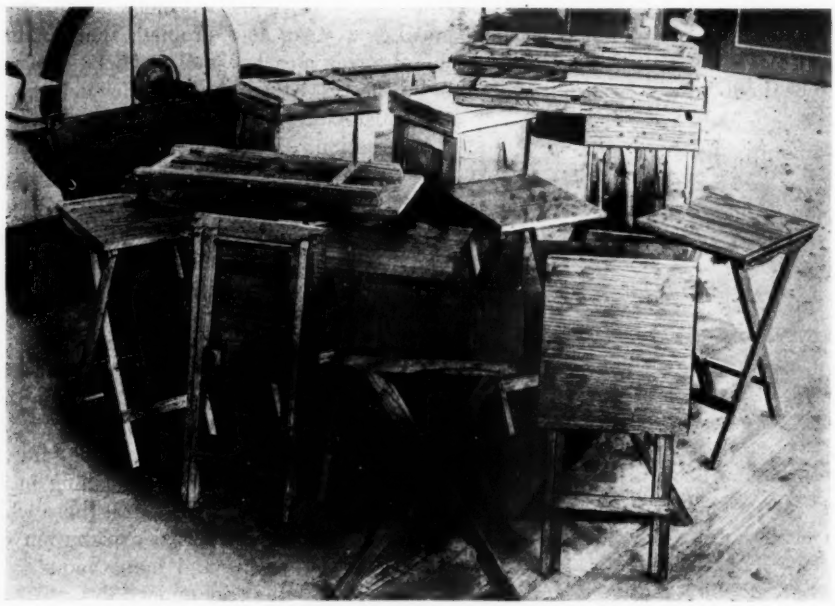
blackboard have the same objections as for "b" with the added objection of calling for labor on the part of the teacher and using valuable blackboard space. "(d)" Sketches made on the blackboard is an excellent method but it also calls for time and space. Of course that is what the blackboard is for, but when we realize that the sketch of the preceding problem must be left for slow Charley and space must be had for hurry-up Willie who is ready for the following plate, there is oftentimes lack of blackboard space. "(e)" Sketches on a large chart are fine. They permit slow Charley to look at his particular chart and hurry-up Willie at his, etc., but most of us would rather have the chart we are interested in right before us where we are at work. "(f)" The plate of the hay rack shown herewith illustrates a method which does not have any of the above handicaps. If the student is given said plate as a blueprint and applies himself the result will be a complete drawing of a hay rack with the thinking and work done by the student and the work of the teacher reduced to a minimum.

The instructor must get this information concerning the hay rack to the student in some way and all that needs to be known is on the blueprint which the student has on his desk. It is the easiest way for the teacher to impart the information and by far the easiest way for the pupil to understand it. Each student can by this method be working at the greatest speed which he is capable of and the instructor is not handicapped even tho a dozen or more plates are under way by different members of a class.

Picture used in connection with plate on page 95.

The accompanying plate of the details of the portable poultry house shows the same method applied to a farm building. A window is a very fine problem by itself but a sure enough window on a poultry house which the student is apt to want to build is much more interesting.

If a picture such as shown can be available for the student to look at, the instructor is bound to have every member of a class interested and working to his full capacity. He will have in his possession at the completion of the course a set of his own plans, each plate of which, to him, has a direct commercial value.



FLU-VACATION WORK.

The bedside tables above were made for the Red Cross by the shop teachers of Dubuque, Ia., during an enforced "flu" vacation. Mr. Ralph Windoes, instructor.

VOCATIONAL COURSES OF STUDY

1—Machine Shop

R. H. Rodgers, Director of School of Industrial Arts, Stout Institute

General Statement.

THE material of the outlined trade courses is presented with certain facts and suggestions in view:

1. Any one of the complete courses covers what a highly skilled and intelligent mechanic should know and be able to do in his trade.

2. The carrying out of such courses depends upon the school facilities which in many cases are limited; consequently it means only the operation and processes indicated under the machines in the local equipment. The completion of any of these courses should not be attempted in less than two years.

3. The tradework should be of such a productive character as not to lose sight of the end point, a skilled, intelligent mechanic.

4. The related technical and trade information should grow out of the immediate practical work and all irrelevant or "dragged in" material discarded.

5. The related vocational guidance information is suggestive for use during the prevocational period and parts of it may well be eliminated in a vocational course.

6. In connection with unit courses of instruction, especially machine shop, it will suggest processes and operations to be covered.

MACHINE SHOP.

Trade Work.

1. Floor and bench work.
   - Chipping, sawing, filing and fitting, using cast iron, bar and angle stock and plate material.
   - Centering stock for work in lathes.
   - Laying out work.
   - Soldering, sweating and brazing.
   - Use of taps and dies, broaching.
   - Forging, hardening and grinding of tools used in shop.
   - Scraping to bearing and spotting.
   - Key seating and fitting.
   - Babbeting and scraping boxes.
   - Belt lacing and gluing.
   - Straightening, leveling, and aligning shafting.
   - Assembling and fitting parts of machines.
   - Oxy-acetylene welding.

Note—The following information is essential and common to the operation of all machine tools and hence applies to each machine for which work is outlined.

   a. Oiling of all bearings.
   b. Methods of chucking or clamping work in machines for all the common operations.
   c. Adjustment of machines so that gears or threads are not stripped or spindle sprung.
   d. Adjustments of feeds and speeds according to size of work, materials used and general character of work.
   e. Setting of tool or cutter.

2. Engine lathe.
   - Cylindrical turning on centers involving proper grinding and setting of tools, roughing cut, finishing cut, use of calipers and scale.
   - Taper turning, involving the necessary calculations, setting of tools, cuts, and use of gauge.
   - Screw cutting, involving the cutting of the right and left-hand sharp V, U, S, S, Acme and square threads; calculating the change gears, lead screw and cross feed.
   - Use of chuck involving facing, boring, reaming, internal threading, and the grinding and the setting up of tools for the same.

3. Use of mandrel.
   - Use of tail stock for deep drilling or boring.
   - Turret lathe.
   - Straight turning.
   - Parting and drilling, using the simple and multiple stop.
   - Drilling and tapping.
   - Form turning.
   - Use of turret plate.
   - Large chuck work.

4. Drill press and radial drill.
   - Speed adjustments for various size drills and kinds of metal; use of lubricants.
   - Methods of holding work.
   - Drilling regular work, held on table with hand or clamped.
   - Boring, facing and reaming.
   - Drilling standardized parts using jigs, fixtures and templates.
   - Drilling work at various angles to the axis.

5. Horizontal and vertical boring mills.
   - Chuck work, including facing, turning, drilling, boring and reaming.
   - Eccentric boring.
   - Taper or angular work.
   - Stub bar work and drilling, turning, facing, and use of angle plate.
   - Supported bar work.

6. Planer and shaper.
   - General machine adjustments, speeds and feeds.
   - Regular work on horizontal and vertical surfaces involving use of vise or shoe.
   - Cutting keyways and slots, use of gauge.
   - Taper and double angle work involving use of stakes, fingers and step parallels.
   - Undercutting and use of anchored tool.

7. Duplicate work.
   - Surfacing large plates.
   - Milling machine.
   - Slabbing involving use of vise or shoe.
   - Use of end mills.
   - Gang milling.
   - Use of dividing head in simple, compound and differential indexing.
   - Fluting of reamers, taps and drills.
   - Cam cutting.
   - Gear cutting including racks, spur, bevel, worm and spiral.
   - Vertical milling.
   - Milling T slots.

8. Grinder.
   - Cylindrical work.
   - Taper work.
   - Surface grinding.
   - Internal grinding.
   - Special angular work.
   - Shapes for special tools.

9. Tool making.
   - Hardening and tempering in oil, lead, sand, flame and air.
   - Case Hardening.
   - Making, hardening and grinding of standard gauges, plugs, drills, reamers, taps, dies, cutters and special tools.
   - Jigs and fixtures, templates.

The arrangement of the various units is not according to any pedagogical sequence. The equipment of a machine shop is such that it is necessary for the instructor to schedule work on all the various machines at the same time and then rotate the students from one to the other during the progress of the course.

RELATED TECHNICAL AND TRADE INFORMATION.

1. Mathematics.
   - Common fractions, decimals, simple equations, equivalents, percentage, ratio and proportion, mensuration and special short cuts applied to practical shop problems which will include wage computations and cost of production.
   - Calculating proper feeds and speeds of cutting tools and grinding wheels, simple and compound gears for thread cutting, speeds and dimensions of line shafts, pulleys, gears, horse power of single and double ply belting, indexing gear work, taper computation.
   - Practical geometry and trigonometry as applied to the setting up of the machines, grinding of tools, and to other shop problems.

Strength of materials, conversion tables, squares, cubes, roots and logarithms, use of hand books and the various formulae.

2. Industrial science.
   Elementary mechanics involving the laws of the lever, wheel and axle, inclined plane, screw and wedge, as applied to machine shop problems. Transmission of power by gears, belts, shafting, friction, rope and chain drives to be used as illustrations.
   Elementary metallurgy covering the properties and composition of cast, malleable and wrought iron, steel, copper, brass, zinc, lead, and babbitt.
   Composition, value and methods of testing lubricating oils, greases and cutting compounds.
   Selection of materials for machine parts, including bearings, spindles, frames, wearing and cutting surfaces, parts under strain and vibration. Wear and oxidation of metals, crystalization of steels under various conditions.
   Heat treatment of various metals covering the expansion and contraction, case hardening, tempering and annealing.
3. Drawing.
   Reading of typical shop working drawings, comparing drawings with rough and finished castings, noting carefully shape, dimensions and finish marks.
   Freehand sketches of machine parts, lay-out work and tool designing.
4. Materials of construction.
   Use of manufacture of cast, malleable and wrought iron, various steels, copper, brass, zinc, lead, babbitt.
   Standardization of general shop supplies, including bars, rods, beams, bolts, nuts, and screws.
   Cost of standard materials.
5. Shop systems and records.
   Tool and stock room systems, time card systems.
   Standardization of machine parts, threads, tools, gauges and general equipment.
6. Machine tools.
   Location of machines for lighting and routing of work, setting and lining up.
   Theory of construction of the various types of machine tools, types of drives and their advantages and disadvantages.
   An analysis of their efficient operation.
   General estimates of cost of machines and equipment.
   Theory of cutting tools covering clearances and rakes as applied to different metals, speeds and feeds. Selection of proper abrasives for various grinding purposes.
   Types of motors, starting boxes and devices, their use and care, simple repair work needed to keep the machine in commission.
7. Hand tools.
   Files, scrapers, polishing materials and devices, their use and care.
   Calipers, gauges, scales, micrometers, squares, hammers, and other scribing and cutting tools, their use and care.
   Cost of a machinist's equipment of hand tools. Quality of tools needed.
8. Supplementary sources of information.
   Texts, magazines, advertising materials, house organs, and shop visits.

SAFETY FIRST AND ACCIDENT PREVENTION.

1. Fire prevention.
   Care and disposal of oily rags, waste, dirty overalls, matches, oils and other inflammable materials.
2. Clothing.
   Dangers of loose or ragged clothing, long neckties or apron strings, gloves, celluloid cap visors, collars or goggles.
3. Use of hand and machine tools.
   Dangers of cleaning, oiling, setting and repairing machines while in motion.
   Dangers of unguarded belts, gears, pulleys, sprockets, sheaves, couplings, clutches, collars, and exposed set screws.
   Shifting of belts, gears, clutches and the throwing in or out of switches.
   Cautions concerning proper setting up of machines and selection and preparation of tools.
   Protection against flying spark, metal chips and dust.
   Dangers of removing guards and not replacing them over gears, pulleys, clutches, belting and grinders.
   Putting hands on revolving or moving work; taking hold of metal shavings or chips.
4. General shop dangers.
   Dangers of oily, dirty, and obstructed stairways and passages.
   Passing under crane loads, scaffolds, balconies and ladders.
   Open pits in the shop floor, loose boards, and elevator shafts.
   Castings or other materials poorly piled.
5. Inattention to work.
   Dangers of horse play, scuffling, carelessness, throwing materials and visiting.
6. First aid.
   Care of and attention to all bruises, wounds and burns.
7. Shop sounds and odors.
   Distinguishing unusual sound and odors such as hot or worn bearings, burning insulation, loose ends of belts or lacing.
8. Legislation.
   Factory laws pertaining to the protection and welfare of the worker.

RELATED VOCATIONAL GUIDANCE INFORMATION.

1. Function of the occupation.
   Relation of the specific occupation to the other trades in the particular industrial organization.
2. Importance of the occupation.
   Numerical place the occupation fills, locally and nationally.
   Value of product turned out, locally and nationally.
   Comparisons with other occupations, using graphic methods to illustrate.
3. Conditions of employment.
   Mental and physical strains involved in the daily routine of the work.
   Specialization and its effect on the worker.
   Dangers involved that must be taken account of; tools, machines, appliances, rigging and scaffolding.
   Welfare work for the improvement of conditions.
   Legislation pertaining to the safeguarding of the worker.
4. Hygiene of the occupation.
   Ventilation and its relation to the health of the worker.
   Fumes, dusts, acids and poisons and their effect on the worker's welfare.
5. Economic conditions.
   Hours and wages of the occupation.
   Average number of working days and income per year.
   Average period of earning ability.
   Comparisons with other occupations, using graphic illustrations.
   Profit sharing schemes, insurance and pension provisions.
   Legislation pertaining to hours and wages.
   Organized or unorganized as a trade.
   Evolution of labor and industry.
6. Entrance to the occupation.
   Age at which occupation is usually entered.
   Various ways of entering.
   Apprenticeship and conditions the learner encounters.
   Legislation pertaining to apprenticeship.
7. Demands for labor.
   Relation between supply and demand.
   Factors influencing the labor market.
   Ratio between the number of workers in the specific occupation and other related trades.
8. Qualifications for success in the occupation.
   Character of education, training and experience needed for success.
   Personality, attitudes and aptitudes requisite for success.
   Importance of good health, hearing, eyesight and mental and physical alertness.
9. Opportunities for advancement.
   Lines of promotion within the trade or industry and the rewards and responsibilities accompanying them.
   Trade and technical requirements needed for advancement.
   Personality, attitudes and aptitudes contributing to promotion.

ART and labor will be found to be closely connected—so much art or skill in even the simplest operation of labor—so much labor involved in the simplest form of art—each so involved in the other, that it would be very difficult to draw the line and say where labor ends and art begins.

—WALTER CRANE.

Lettering Essentials for the Commercial Design Student

Elizabeth Weiffenbach, Lafayette High School, Buffalo, N. Y.

(Part III)

Classic Roman.

THIS is the most beautiful and dignified style of lettering and the most difficult for the pupil to draw. It has such strong individuality that even a slight change will affect its character. It has to be drawn just about as it was centuries ago. Naturally the artist's personality will enter in somewhat, but if too many personal touches occur the Classic Roman disappears and we have something else not quite the same.

The most characteristic thing about the Roman letter is that it is composed of definite thick and thin lines. It is an inexcusable mistake to have the two weights of lines placed wrongly in a letter. The heavy parts of the A or M, or any other letters, are always in the same place. This is an inflexible rule due to hundreds of years of established precedent.

Originally the letters were cut in stone, and before the introduction of printing the letters were written with a broad reed pen which was cut at an angle, and which made a broad stroke downward and a light stroke upward. An experiment with a stub pen will convince the beginner which parts of the Roman alphabet must be shaded.

CLASSIC ROMAN

ABCDEFGHIJKLM

NOPQRSTVWXY

abcdefghijklmnopqrs

tuvwxyz 123456

Fig. 32.

The serif of the Classic Roman varies somewhat, but it is never clumsy or square. C, G, O, and Q are perfectly round letters. The ampersand has a variety of forms other than the one shown. The spot emphasizing the space between the alphabet and the ampersand is one which doubtless is derived from a chisel stroke in the original stonecut letter. The circle may be used with this type, or other shapes which suggest the early chiselled forms.

The lower-case letters do not belong strictly to the Classic Roman style, which was developed at a time when there were no small letters in existence. However, there are many lower-case styles which are

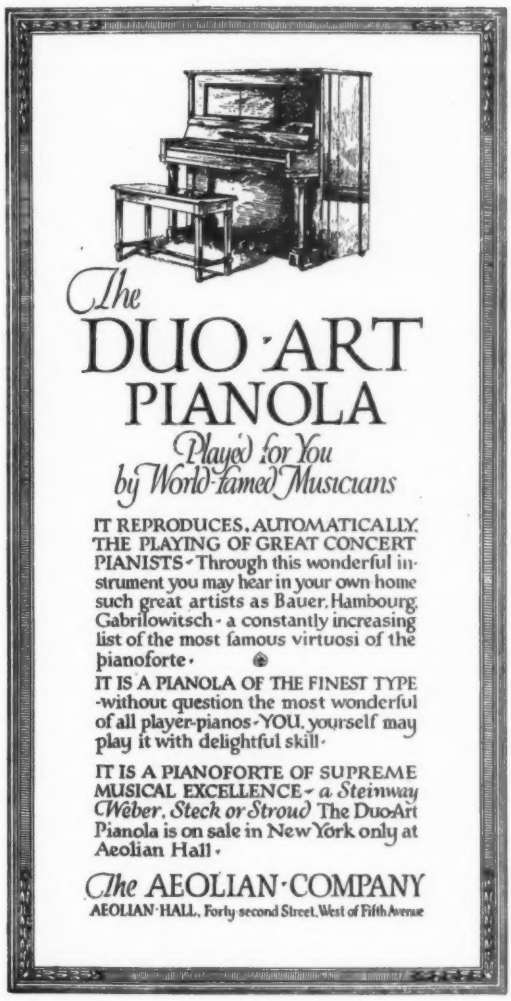

The
DUO-ART
PIANOLA
Played for You
by World-famed Musicians
IT REPRODUCES, AUTOMATICALLY, THE PLAYING OF GREAT CONCERT PIANISTS - Through this wonderful instrument you may hear in your own home such great artists as Bauer, Hambourg, Gabrilowitsch - a constantly increasing list of the most famous virtuosi of the pianoforte.
IT IS A PIANOLA OF THE FINEST TYPE - without question the most wonderful of all player-pianos - YOU, yourself may play it with delightful skill.
IT IS A PIANOFORTE OF SUPREME MUSICAL EXCELLENCE - a Steinway, Weber, Steck or Stroud. The Duo-Art Pianola is on sale in New York only at Aeolian Hall.
The AEOLIAN COMPANY
AEOLIAN HALL, Forty-second Street, West of Fifth Avenue

Fig. 33.

perfectly in harmony with the dignity and refinement of the capitals, and which of course are used where designs require it. Fig. 32 is the drawing of a lettering student.

The advertisement of the Duo-Art Pianola

Fig. 34.

(Fig. 33) is a beautiful piece of lettering and design. The drawing of the Pianola and the large title place

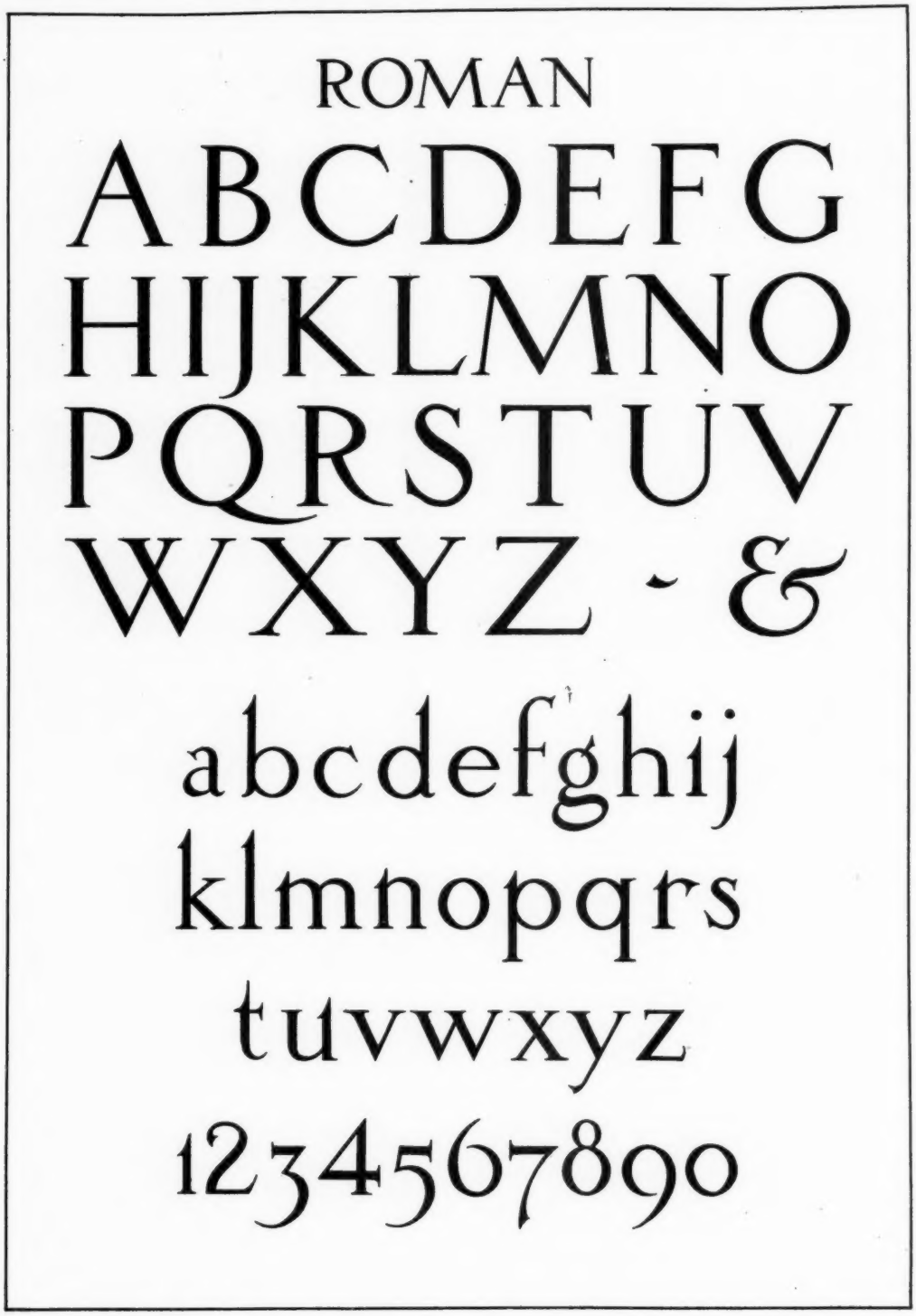


FIG. 31.

Notice how the lettering and placing bring out these facts. The masses formed by the illustration, the

the emphasis where it belongs, and the attention of the eye is caught there. The name of the company is of second importance, and the description third.

lettering, and the border are well related. The variety and size of the white spaces help to concentrate the attention on the lettering masses.

PACKER'S
LIQUID
TAR SOAP

Fig. 35.

The firm name Hanson Studios (Fig. 34) is Classic Roman in feeling, but the little white spaces and somewhat exaggerated drawing change the char-

Geo. Borgfeldt & Co.
GLOVE
Department

Fig. 36.

acter of the style. Among the countless commonplace firm-name designs it stands out because of its distinction.

Open face, or outlined letters, apparently assume a refinement which the same size and shape of letter

CONCRETE FOR PERMANENCE
PENNSYLVANIA
PORTLAND CEMENT

Fig. 37.

might not have if in solid color. Figs. 35 and 36 are commercial examples of this style.

Many beautiful examples of Roman lettering may be found in advertising designs, generally in small bits such as Fig. 37. It is only recently that designers have been commissioned to execute a whole advertisement such as that of the Duo-Art Pianola. In Fig. 33 the pupil has attempted refinement of lettering to fit the distinction of the car.

ABCDEFGHIJKLMNO
PQRSTUVWXYZ&
1234567890
abcdefghijklmnopqrstuvwxyz

Fig. 40.

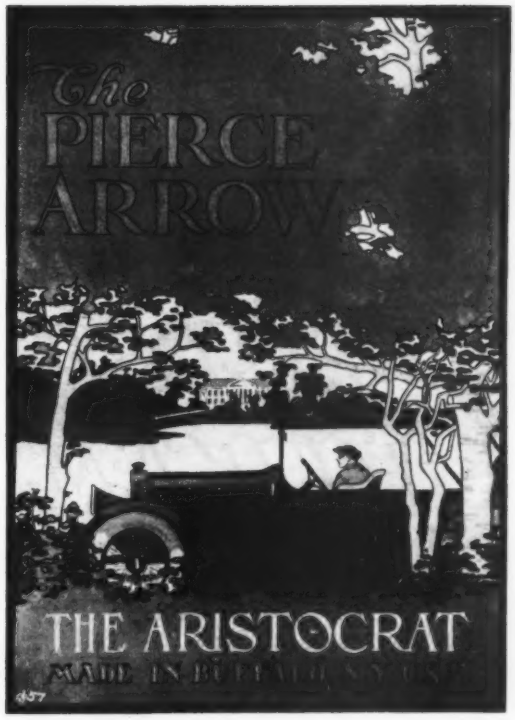


Fig. 38.

ABCDE
FGHIJK
LMNOP
QRSTW
UVXYZ
ITALIC

Fig. 39.

Fig. 41.

Italic and Script.

The Italic letter (Fig. 39 and 40) is an inclined Roman. It is a very flexible type and is capable of a great deal of refinement as well as much force. Where emphasis or variety are needed in designs in which the principal lettering is in Roman, the Italic will serve a useful purpose.

Script letters (Figs. 41 and 42) are much like the Italic, but are more elaborate. They are a step between the Italic and the written letter. One might say they are Italic drawn with a flourish. Where delicacy and charm are wanted in an advertisement it is just the thing to use. The clippings from magazines (Fig. 43) shown an appropriate relationship of the articles advertised and the lettering used.

It is hard to draw the line between the Script and Italic in most commercial examples, because designers generally use a great deal of freedom with these styles.

Fig. 42.

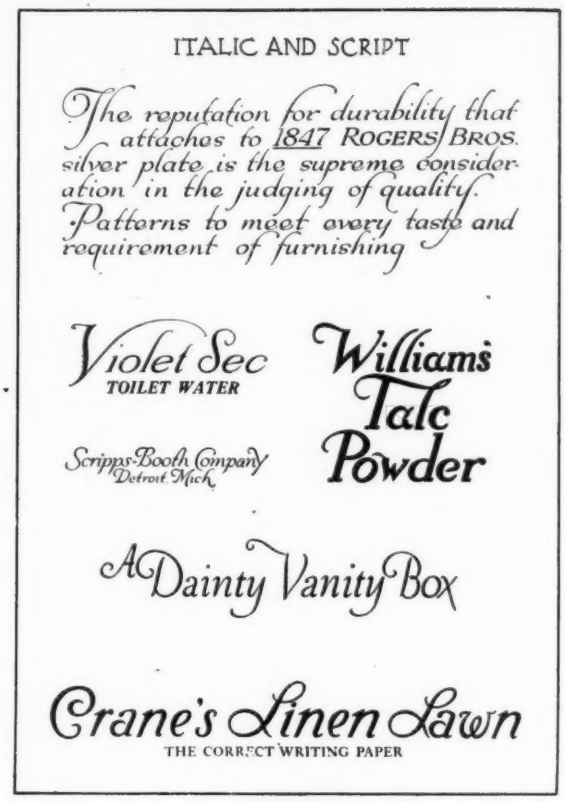

ITALIC AND SCRIPT
The reputation for durability that attaches to 1847 ROGERS BROS. silver plate is the supreme consideration in the judging of quality. Patterns to meet every taste and requirement of furnishing
Violet Sec
TOILET WATER
Williams
Talc
Powder
Scripps-Booth Company
Detroit Mich.
A Dainty Vanity Box
Crane's Linen Lawn
THE CORRECT WRITING PAPER

Fig 43.

Fig. 44.

Fig. 46.

Fig. 47.

Eccentric Letters.

It is a good thing for the student to do at least one or two plates of eccentric letters if only to realize how very much the alphabet can be changed and still be legible. It will help to shape the feeling for letter construction, proportion, spacing, and design and may help to develop originality. Fig. 44 is an adaptation of a French alphabet, and Figs. 45 and 46 are examples of a commercial use of it. Fig. 47 was drawn by a pupil.

The unusual always has a place in advertising art and if combined with design principles and commonsense are sure interest creators. As far as lettering is concerned, it should harmonize with the idea expressed in text and illustration and should be legible without too much effort on the part of the reader. Good judgment must be used by the designer when using novelties.

Fig. 45.

BIRD HOUSE ARCHITECTURE

Leon H. Baxter, St. Johnsbury, Vt.

PROGRESSIVE study of our native birds by competent individuals especially thru the United States Department of Agriculture in its Farmers' Bulletins has shown very decisively that for the very slight amount of fruit taken by our feathered friends the return made by them by ridding our gardens and orchards of the destructive worms and insects is many times as valuable as the small commission they collect by sampling a berry or two here and there.

The innumerable quantities of seeds of plants and weeds which would otherwise overrun our gardens are eaten by the birds. This, together with the fact that these same birds with their brilliant plumage and beautiful songs are a valuable asset to our neighborhood, ought certainly to impress us that they are deserving of our assistance and protection. Assistance is best afforded by preparing suitable houses and feeding boxes for them, and also by placing bits of string, horsehair, and other nesting material convenient for them. Protection is simple and may be limited to laws safeguarding birds from harm, to killing off as many as possible of the English sparrows, and to seeing that cats are not allowed any undue opportunity for harming them.

To successfully entice the birds to a man-made home, there are certain rules which experience has proven we must follow.

The following drawings have been made as near correct as careful study of all available data on the subject will allow. The author feels confident if they, together with the specifications that go with them are carefully followed the artisan will be amply rewarded by finding all bird tenements "let" as soon as the spring migration and nesting season starts. These houses and many of varied design have been successfully built by pupils of the seventh and eighth grades with over 75 per cent of success in having them occupied.

The table below gives the correct dimension for quite a variety of houses for different birds:

The size of the opening is very important as it is essential that it be no larger than is necessary for the bird for whom it is intended to conveniently enter.

The smaller song birds will be bothered a great deal by the English sparrow who enters if the opening is not kept very small. It is considered by a great many authorities that a perch is not a help but a hindrance at the opening. The sparrows sit there and by their incessant chirping drive out or annoy the more desirable occupants.

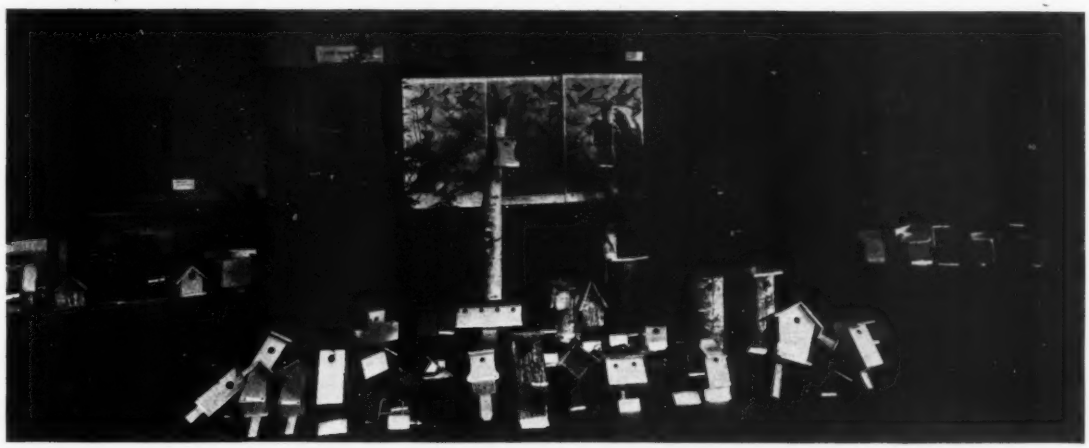
It is exceedingly important that there be some means of cleaning out bird houses at the season's end. This may be taken care of by having the roof removable or the bottom hinged.

There should be a few small holes bored in the bottom to allow any moisture that might accumulate to drain. Also another set of holes at least ¼ inch in diameter should be bored for ventilation, high enough so that no drafts will affect the young. These are best located just under the eaves.

Some device for attaching the house to a building or tree should be provided. It is best to have the house stationary to prevent undue swinging in a high wind. Houses of unusual shape or design are not considered as good as the plainer types, the idea being to make the house harmonize as naturally with the surroundings as possible.

TYPICAL SPECIFICATIONS FOR BIRD HOUSES.

	Floor area in inches	Depth in inches	Entrance above floor in inches	Di. of Ent. inches	Height from ground in feet
Bluebird	5 by 5	8	6	1½	5–10
Robin	6 by 8	8	(1)	(1)	6–15
Chickadee	4 by 4	8–10	8	1⅛	6–15
Tufted titmouse	4 by 4	8–10	8	1¼	6–15
White-breasted nuthatch	4 by 4	8–10	8	1¼	12–20
House wren	4 by 4	6–8	1–6	⅞	6–10
Bewick wren	4 by 4	6–8	1–6	1⅛	6–10
Carolina wren	4 by 4	6–8	1–6	1⅛	6–10
Dipper	6 by 6	6	1	3	1–3
Violet-green swallow	5 by 5	6	1–6	1½	10–15
Tree swallow	5 by 5	6	1–6	1½	10–15
Barn swallow	6 by 6	6	(1)	(1)	8–12
Martin	6 by 6	6	1	2½	16–20
Song sparrow	6 by 6	6	(2)		1–3
House finch	6 by 6	6	4	2	8–12
Crested flycatcher	6 by 6	8–10	8	2	8–20
Red-headed woodpecker	6 by 6	12–15	12	2	12–20
Golden-fronted woodpecker	6 by 6	12–15	12	1½	12–20
Hairy woodpecker	6 by 6	12–15	12		
Downy woodpecker	4 by 4	8–10	8	1¼	6–20
Screech owl	8 by 8	12–15	12	3	10–30
Sparrow hawk	8 by 8	12–15	12	3	10–30
Saw-whet owl	6 by 6	10–12	10	2½	12–20
Barn owl	10–18	15–18	4	6	12–18
Wood duck	10–18	10–15	3	6	4–20



AN EXHIBIT OF BIRD HOUSES IN THE ST. JOHNSBURY MUSEUM.

The color scheme is also very important. Bright, shiny paint should be avoided. Dull greens or browns are good. Sometimes it is suggested that houses should be made early enough so that they might be hung in place to weather and lose the painty smell before the expected tenants arrive.

Cedar bark is an exceptionally fine covering to apply to the exterior, as it lends itself very successfully to the natural surroundings.

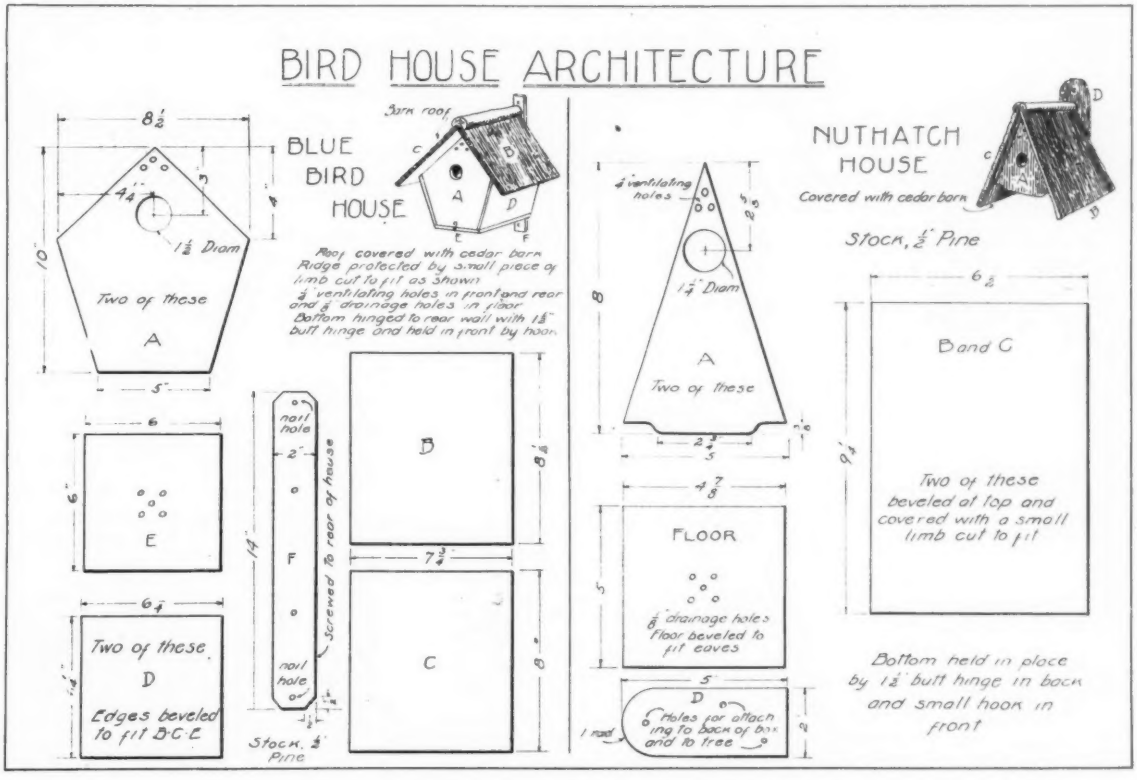
The house should be placed in a quiet spot away from the direct rays of the sun, high enough to be out of the way of prowling cats or too inquisitive human beings. Some birds such as the flicker do not care to nest very close to human habitation; they are "deep woods" birds and inhabit houses far from dwellings.

It is clearly seen now that there are quite a number of things to keep in mind as we prepare our plans for the homes of the future feathered inhabitants.

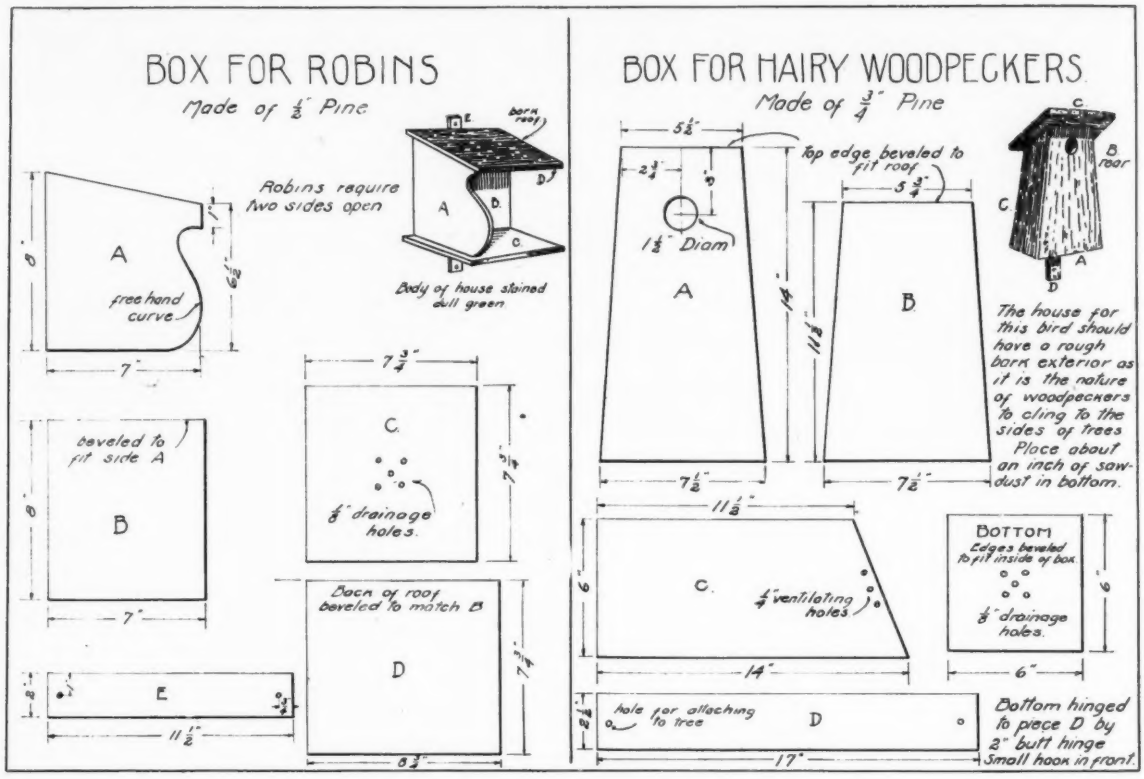
Method of Conducting a Birdhouse Contest.

St. Johnsbury is very fortunate in having a fine Museum of Natural Science with a corps of very efficient directors, and every year they donate a substantial amount of prize money as rewards for the best houses constructed by grammar-school pupils.

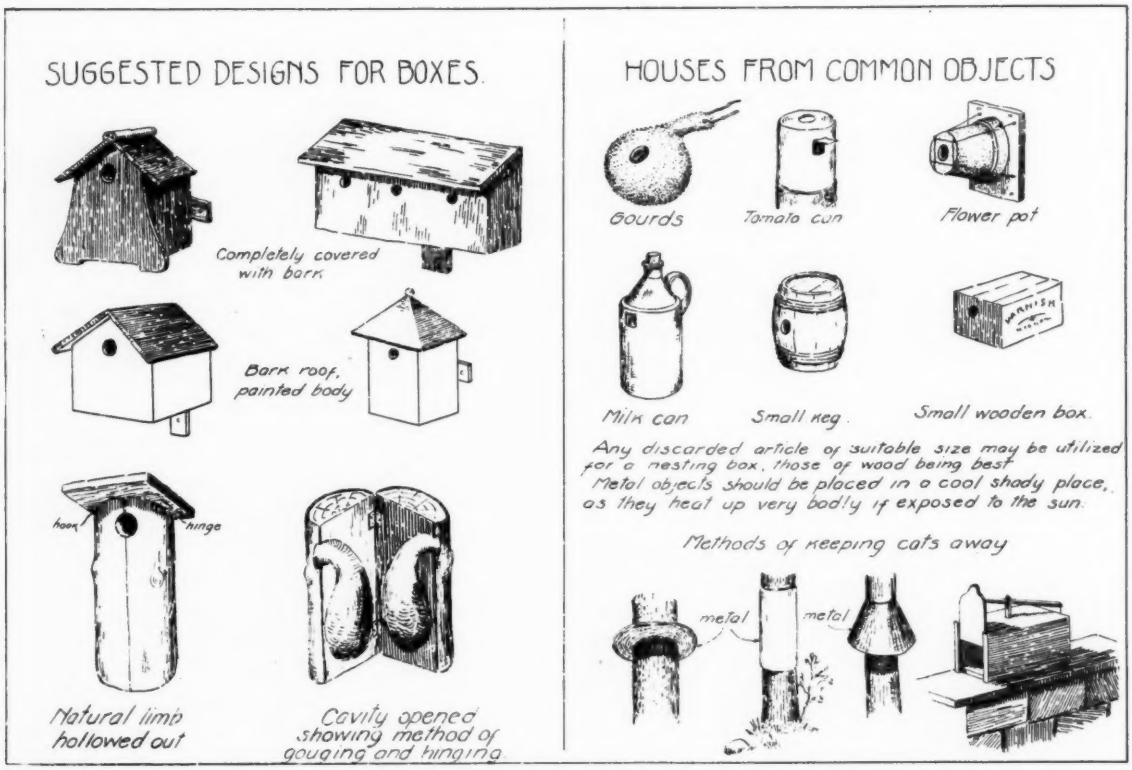
The local Commercial Club, as well as many of the merchants, also add generously to the fund so


BIRD HOUSE ARCHITECTURE
BLUE BIRD HOUSE
Barn roof
Roof covered with cedar bark. Ridge protected by small piece of limb cut to fit as shown. ¼" ventilating holes in front and rear and ¼" drainage holes in floor. Bottom hinged to rear wall with 1½" butt hinge and held in front by hook.
Two of these
A
1½" Diam
NUTHATCH HOUSE
Covered with cedar bark
Stock, ½" Pine
¼" ventilating holes
1¼" Diam
Two of these
A
FLOOR
⅛" drainage holes. Floor beveled to fit eaves
Band C
Two of these beveled at top and covered with a small limb cut to fit
Bottom held in place by 1½" butt hinge in back and small hook in front
Two of these
D
Edges beveled to fit B-C-E
E
F
nail hole
Screwed to rear of house
Stock, ½" Pine
B
C
Holes for attaching to back of box and to tree
1 rod

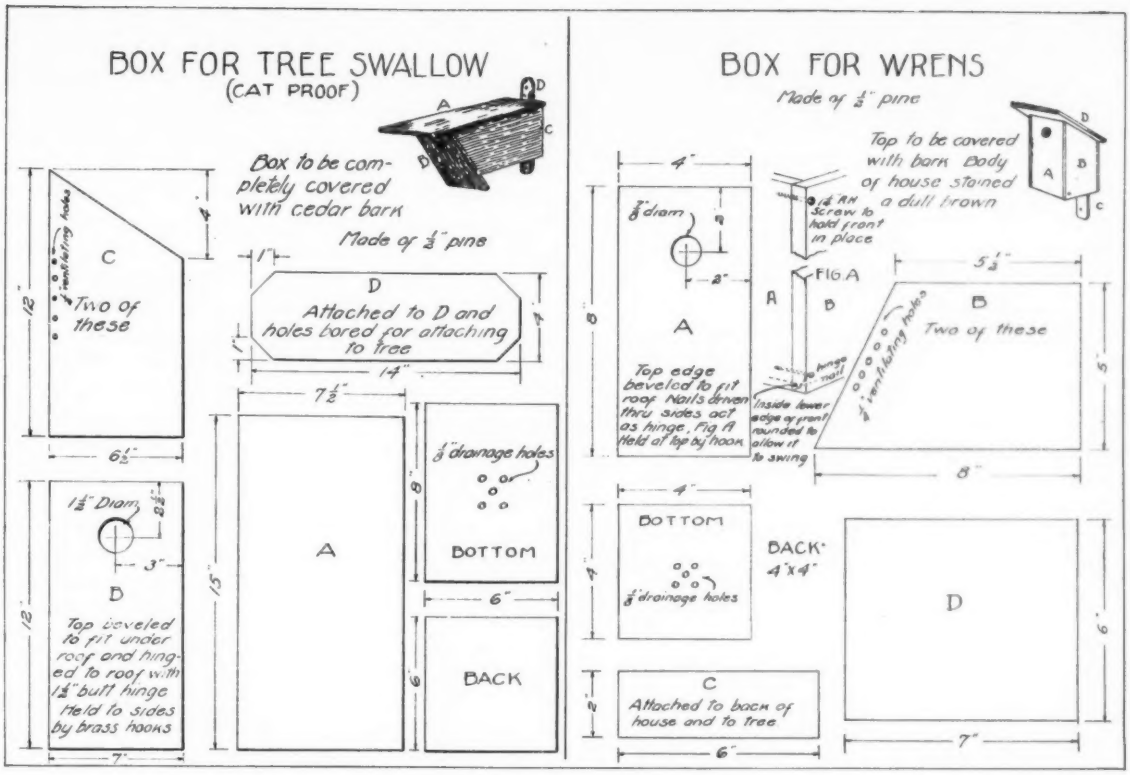
DETAILS OF TYPICAL BLUEBIRD AND NUTHATCH HOUSES.


BOX FOR ROBINS
Made of ½" Pine
Robins require two sides open
Body of house stained dull green
free hand curve
beveled to fit side A
⅜" drainage holes.
Back of roof beveled to match B
BOX FOR HAIRY WOODPECKERS
Made of ¾" Pine
Top edge beveled to fit roof
1½" Diam
The house for this bird should have a rough bark exterior as it is the nature of woodpeckers to cling to the sides of trees
Place about an inch of sawdust in bottom.
¼" ventilating holes
BOTTOM
Edges beveled to fit inside of box.
⅜" drainage holes.
hole for attaching to tree
Bottom hinged to piece D by 2" butt hinge
Small hook in front.

DETAILS OF ROBIN AND WOODPECKER HOUSES.


SUGGESTED DESIGNS FOR BOXES.
Completely covered with bark.
Bark roof, painted body
hook
hinge
Natural limb hollowed out
Cavity opened showing method of gouging and hinging.
HOUSES FROM COMMON OBJECTS
Gourds
Tomato can
Flower pot
Milk can
Small keg
Small wooden box.
Any discarded article of suitable size may be utilized for a nesting box, those of wood being best. Metal objects should be placed in a cool shady place, as they heat up very badly if exposed to the sun.
Methods of keeping cats away
metal
metal

SUGGESTIONS FOR BIRD HOUSES.


BOX FOR TREE SWALLOW
(CAT PROOF)
Box to be completely covered with cedar bark
Made of ½" pine
Two of these
Attached to D and holes bored for attaching to tree
1½" Diam.
Top beveled to fit under roof and hinged to roof with 1½" butt hinge Held to sides by brass hooks
⅜" drainage holes
BOTTOM
BACK
BOX FOR WRENS
Made of ½" pine
Top to be covered with bark Body of house stained a dull brown
Fig A
Two of these
Top edge beveled to fit roof Nails driven thru sides act as hinge, Fig A Held at top by hook
BOTTOM
BACK 4"x4"
Attached to back of house and to tree

DETAILS OF HOUSES FOR SWALLOWS AND WRENS.

that the boys and girls beside having an incentive for helping bird friends from an economic standpoint also have a chance of profiting financially.

Previous to starting work the museum instructor gives interesting lectures on the necessity of providing all assistance possible for the birds, and by stuffed specimens shows the size of opening, etc., required for different species. He also goes into detail concerning the ventilation, drainage, coloring and placing of the houses.

Original designs are encouraged and with discussion and good advice the actual work starts. A stated amount of time is allowed for completing the houses and the material is paid for by each pupil. On the appointed day the houses are numbered and grouped and are ready for the judging.

Three judges are appointed from among people who are proficient to judge such an exhibit, usually one of the museum instructors to judge the technical side, a carpenter or mechanic of some sort to judge the workmanship, and a person who is interested in art to take care of the general design and appearance.

The method of marking is as follows:

Fitness to purpose	50%
Skill in workmanship	30%
Appearance, design, color	20%
Total	100%

Each judge marks individually on the tally and the box whose score is highest in the estimation of all, receives first and so on thru all the prizes.

Sometimes the pupils judge the display beforehand and compare their results with those of the selected judges, and it has proven generally that boys and girls will use very excellent judgment in selecting the winners.

The prizes are usually tools, good books, and thrift stamps, and this annual event is looked forward to with keen anticipation by the youthful designers.

VICTORY AND PEACE.

Dr. James Parton Haney.

Our pulses all still thrill with Victory!
Our eyes it seems, can look beyond the seas
To where the heavy clouds on lands once fair
Have lifted—showing Peace enthroned again.
Our hearts are moved with mingled joy and pain.
Joy for the triumph of the right, yet grief
For all the agony the years have brought
To thrift, to virtue and to innocence.

We hail the glorious banners of the free
And thrice the loyal hands which bore them high
For half a hundred months amist the wrack
And flame of battle and of sudden death.
We hail the pow'r which strengthened women's hearts
Thru bitterest times of trial, when mothers gave
Their sons, and wives their men; while plighted troth
Released the lover for a dearer love.

We hail that passion far too deep for words
Which moved our Nation to make common cause
And raise a living wall across the path
Of ravening horde. Our costly sacrifice
We laid upon the altar of the Free,
That it might there commingle with the blood
Of France, of Belgium, England, Italy.

And now our hearts are swelled with gratitude
That Right hath still prevailed, and Liberty;
While Honor, Justice, Kindness, Pity, Ruth
Have triumphed in a glorious victory.

—From the Prologue to a Victory Pageant written by Dr. Haney for the girls of the Washington Irving High School, New York City.

INDUSTRIAL-ARTS MAGAZINE

Board of Editors

E. J. LAKE S. J. VAUGHN

W. H. HENDERSON

EDITORIAL

EQUIPMENTS OF SCHOOL AND HOSPITAL SHOPS.

A GREAT many of our teachers could profit by certain lessons to be drawn from the educational work of the Reconstruction Hospitals. One very noticeable thing has been the extremely limited and simple equipment used in the various hospital shops. The ordinary high school in a town of fifteen thousand inhabitants has an elaborate equipment as compared to the meager equipment of any military hospital in the country. Undoubtedly more extensive equipments would soon have been installed, had it not been for the abrupt cessation of hostilities.

Even with these small equipments the disabled men are being provided with work that is not only curative but is at the same time, in very many instances, genuinely vocational. Results have been obtained that are nothing short of remarkable both in the amount and quality of the work done. The secret is that much equipment has been improvised and every item of equipment is being used to its utmost capacity.

It is not generaly true that schools are overequipped, but there are many conspicuous exceptions to this rule. And when we consider the point of maximum use of equipment, the schools fall far short of the achievement of the hospitals along this line. There is going to be a strenuous effort made in the next few years to eliminate all possible waste from the schools, and undoubtedly one of the greatest wastes has been idle equipment. A good rule to follow is, "Buy equipment judiciously, use it to its fullest capacity, and give it the utmost care."

BEAUTY AND UTILITY.

WITH the prospect that a great number of memorials will be erected over the country expressing the thankfulness of the people for deliverance from a continuation of war and appreciation of patriotic service, there is much need of careful selection and design.

The American Federation of Arts following the example of the Royal Academy of Arts of London, has formulated and sent out suggestions for the treatment of war memorials. The Federation will promote this purpose of securing consistent and appropriate war memorials by making this subject the chief interest of their annual meeting to be held at the Metropolitan Museum of Art in New York in the month of May. Committees having the design and construction of such memorials in hand would do well to seek the co-operation of the American Federation.

One such committee in a thriving community of the Middle West solicited suggestions from the citizens thru the press. Many suggestions were received but a majority favored a monument that would be "useful as well as ornamental." We surmise that this conception of a memorial is general in America. Beauty and utility is indeed a fine combination but persistence in the demand for both leads to the suspicion that they are considered of little value apart and that they are not interdependent. We would make one suggestion to committees who have war memorials in hand.

The finest memorials ever constructed *have served longest as memorials* because they have been *beautiful.* The creations of mankind have been preserved as memorials by their beauty even after they have persisted as material monuments. It is the beauty of the Greek heroes and gods preserved in a fine idealization of form that makes them known to us so many centuries after the monuments themselves have been reduced to a few fragments.

It may be altogether desirable and appropriate to erect monuments to our heroes that will serve a useful, material purpose for a few years, but let us recognize that the most important use of a memorial is to memorialize, and that beauty is the most significant and durable element of design in a memorial.

THE TIME ELEMENT IN MANUAL TRAINING.

IT has been repeatedly pointed out by this and other publications that the time devoted to manual training is entirely too meager to make any very important contributions to vocational fitness. It has been computed by the mathematically inclined that the average boy in the elementary school spends less than one week in actual shop work.

We are inclined to think that considering the small amount of time devoted to this subject, the lack of preparation on the part of its teachers, and the generally difficult conditions under which it has been given, it has shown some remarkable results and has fully justified its existence.

But when it comes to asking an extension of time, almost insurmountable difficulties are immediately encountered. First of all, there is the time honored and affectionate regard for the so-called "regular" or traditional subjects whose schedule cannot be interfered with without provoking the wrath of the "regular" school people. Manual training must make and sustain its case with these people. The consideration which the manual training man must face, however, is the one relating to the character of his work.

School men say, "What's the use of granting more time, if the work is to retain the same character? What shall be done in the extra time? Shall the boy, make more book racks, coat hangers, taborets, etc.

or shall he do additional "exercises" for the sake of the "tool processes"? Is there to be a new type of work developed sufficiently valuable to deserve additional time, or shall the boy take the whole time to do what he had previously done in the limited time? Just what is to be done with the additional time allowance, should it be granted?

In other words, there is some impression that manual training is a considerable time waster, and that it is a more or less artificial and non-essential adjunct to the school. The questions being raised concerning the need of longer time are pertinent questions that must not only be answered in argument but must be met with conclusive demonstrations of work of such richness, variety and merit as to make an extension of time indispensable to both pupils and schools.

LET US HOPE.

IN the preamble to the Constitution, the American Federation of Teachers, affiliated with the American Federation of Labor, is the following statement:

"We believe that the teacher is one of the most highly productive of workers, and that the best interests of the schools and of the people demand an intimate contact and an effective co-operation between the teachers and the other workers of the community—upon whom the future democracy must depend."

This statment must meet with the approval of every thoughtful person, for education, labor and democracy can be helped forward immensely by intimate contact and effective co-operation.

The exact relation which this co-operation may effect is suggested by a quotation from a recent address by Eugene Davenport.

"This struggle of the working man upward with nothing but his bare hands with which to earn his living and to defend his constitutional rights, is one of the most pathetic chapters in the history of democracy, challenging the sympathy of every intelligent man and woman. But it is also one of the most revolutionary and dangerous; and while no righteous man can fail to sympathize fully with the major purpose of organized labor, and while he must admit that the methods employed have often seemed inevitable, he must also feel in the very marrow of his bones that a better way than this must be found for settling questions and issues of public policy."

When education and labor affiliate there should be hope of discovering the better way. Labor is becoming interested in education. Education is becoming interested in labor. They have only become disinterested thru the misconception that they had little in common. We are beginning to realize that they are interdependent and that the salvation of both rests on their affiliation.

A MEASURE OF THE WORK.

ARE the products of instruction in the industrial arts measurable? Are there dependable objective tests which will make a process of measuring reasonably accurate? Can such measurements be reduced to a practical, workable scheme which any teacher can apply?

The recent growth of standard tests as tools which the teacher and administrator use to measure the products of the three R's, suggest the foregoing questions.

Every teacher of shopwork, drawing and household arts who has been alive to what is going on about him in the grades has felt the lack of objective tests which he can apply to judge his teaching, to compare it with the teaching of his colleagues, and to prove the educational values of his subject. The tests in the several common subjects—the Courtis arithmetic sheets, the Ayres writing and spelling charts, the Thorndyke reading scales—are simple, because the desired product of the teaching in these subjects is simple and clear and close at hand. The teacher of industrial arts has not seen clearly how similar charts and scales and tests might be prepared for his subject, because the purpose of his teaching—even tho he has it clearly before him—lies beyond the mere squaring of a board or the making of a mortise and tenon joint.

The problem of formulating tests for elementary manual arts is interesting and important. The *Industrial-Arts Magazine* hopes to contribute to its solution thru the publication, in the April issue, of a test that appears to be usable and dependable, and that will afford all teachers of the manual arts an opportunity to work co-operatively in the formulation of standard tests.

THE SCHOOL SHOP AND THE FLU.

REPORTS have been trickling into the office of the *Magazine* which indicate a wide variety of effort on the part of shop teachers to overcome the evil effects of the recent epidemic of influenza and to continue their work with some degree of effectiveness. In numerous cities, where the schools were shut down completely, the teachers organized themselves into groups and manufactured school furniture and equipment, articles for the Red Cross, etc. Some undertook repairs and refinishing of school furniture. Numbers of instructors worked in war industries and many helped in taking "flu census," etc. In several cities the teachers spent the full days in their shops, instructing groups of four or six boys, outlining lessons for home study, etc. In some communities, lessons were outlined thru the newspapers and the children were encouraged to undertake projects and repairs in the home.

Teachers of industrial arts and trade subjects showed thruout the epidemic a fine spirit of service and made commendable efforts to overcome the evils of an unavoidable situation.

THE HELIX WITH PRACTICAL APPLICATIONS

F. M. Dannenfelser, Muskegon, Mich.

The Helix.

A SPACE curve is one that traverses space and does not lie in a plane.

Definition: A helix is a space curve or line of double curvature generated or traced by a point moving uniformly around the surface of a cylinder, and at the same time advancing uniformly in a direction parallel to the axis of the cylinder. For example, as the point moves one-twelfth around the surface of the cylinder, it advances or ascends one-twelfth of the pitch or lead.

The helix is a most important curve. In constructive work it has many applications. Among them are the following: screw threads with their numerous uses of fastening and securing parts together; adjustments, transmitting power and motion; springs to produce pressure, absorb shock, and obviate wear; helical gears with their advantages over spur gears, their quietness and smoothness in operation; spiral or gravity conveyors, with their efficient conveyance of material from one floor to a lower floor in modern factory practice. It is a very economical means of moving goods, for, in applying the principle of gravity, no power is needed. In a similar way it is used for fire escapes to convey human beings to safety. It is also used on automatic machines in designing uniform motion cylindrical or drum cams. One has to marvel at the properties of this wonderful curve when we consider its application to screw propellors, especially to propellor blades for use on all kinds of ships, submarines, torpedoes, and airships. Without a clear understanding of this important curve and its use in designing and constructing screw threads, milling cutters, drills, reamers, gears, cams, etc., etc., one cannot be a thoroly competent and efficient toolmaker or machinist. The pattern maker and foundry man has need of it in making patterns and castings for worm and worm-wheels, propellors, etc. In sheet-metal work it is used in making cold air ducts, in designing the aforementioned conveyors, and in procuring the true length of stock in iron stair-case work.

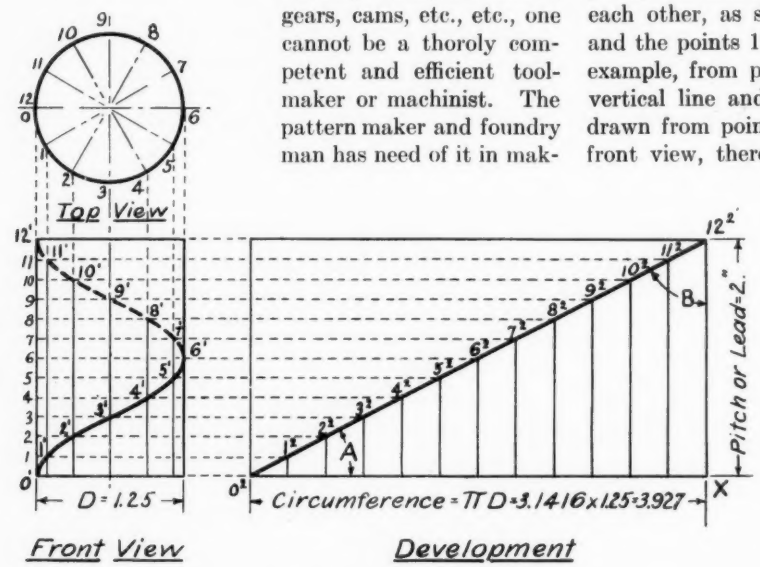


Fig. 1.

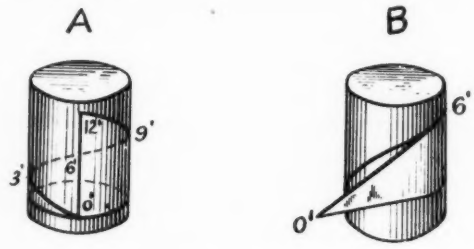


Fig. 2.

The development of the helical curve shown in Fig. 1 is an inclined plane, and if the right triangle 0^2-x-12^2 is wrapped about the cylinder, the hypotenuse 0^2-12^2 would form the helical curve $0'-6'-12'$ in the front view, that is, points 1′, 2′, 3′, etc., in the front view would correspond to points 1^2, 2^2 3^2, etc., in the development. This is clearly shown by the shaded pictorial representations at A and B, Fig. 2.

Method of Drawing the Helix and Its Development.

When the term helix is used it is generally understood to mean a cylindrical helix.

Draw the circle representing a top view of the cylinder. Then draw the front view as shown. Divide the circle in plan and line $0'-12'$ of the front view (called pitch or lead) into the same number of equal parts, in this case, 12. Project like points to intersect each other, as shown by the dotted projection lines and the points 1′, 2′, 3′, etc., of the front view. For example, from point 1 on circle in top view drop a vertical line and intersect it with a horizontal line drawn from point 1 on the pitch line $0'-12'$ of the front view, thereby locating point 1′ on the helical curve. Proceed in like manner for the remaining points.

Note that the points 0′ to 6′ inclusive, lying on the front half of the cylinder are visible and the line connecting these points is a full or contour line while the line connecting points 6′ to 12′ inclusive, lying on the back of the cylinder, is hidden from view and must be shown as a dotted or hidden line. Also notice that the visible half is exactly similar to the invisible half, but in a reversed position.

The helix may be either right or left-handed.

How to Determine Whether Helix is Right or Left-Handed.

When the cylinder or screw is in a vertical position, the visible half of a right-handed curve or thread slants from upper right to lower left, and from upper left to lower right when curve or thread is left-handed. When the cylinder or screw is in a horizontal position a "right-handed" helix or thread slants from left at the top edge to right at bottom edge, and vice versa for left-handed helix.

The development is found by "laying-out" a pattern for the cylinder and drawing a diagonal across it. Draw the horizontal line 0^2-x equal in length to the circumference of the circle in the top view. For approximate results this may be accomplished by stepping off arc $1-2$ of top view twelve times along line 0^2-x. For more accurate work compute the length of the circumference by using the formula:—cir. equals *pi* times the diameter.

From this it is evident that a portion of the helical curve between two given points is the shortest line that can be drawn on a cylinder, excepting, of course, those points lying on a circumference, or a line parallel to the axis of the cylinder.

Altho the motion both around the cylinder and in the direction of the axis is uniform, the rate of movement is independent of each other, that is, in moving once around the cylinder the point generating the helical curve may advance a small or large distance from zero on a circle to infinity on a straight line, according to the job to which it is applied.

Calculations.

Formula for finding true length of helix:

$$\text{Hyp. } 0^2-12^2=\sqrt{\text{cir.}^2+\text{pitch}^2}=$$
$$\sqrt{(3.1416\times1.25)^2+2^2}=\sqrt{14.6459+4}=\sqrt{18.6459}$$

Hypotenuse = 4.318 inches.

The method of computing the helix angle A, and its complement angle B, the angle the curve makes with the axis, is as follows:

$$\text{Tan. A}=\frac{\text{pitch}}{\text{circum.}}=\frac{2}{3.1416\times1.25}$$

Tan. A = .50929

A = 26° 59′ 20″

B = 90° − 26° 59′ 20″

B = 63° 0′ 40″

PRACTICAL APPLICATIONS OF THE HELIX. I.

Helical Gearing.

The term "Helical Gearing" is applied to spiral gearing of the spur gear type, that is, spiral gearing having shafts parallel.

Helical gears are used extensively on automobile motors, automatic machines, tools, etc. From the standpoint of efficiency and utility, helical gearing has many advantages over spur gearing. Of especial importance is quietness and smoothness in operation which is the result of point contact, and gradual engagement of the teeth, and the teeth being continually in contact.

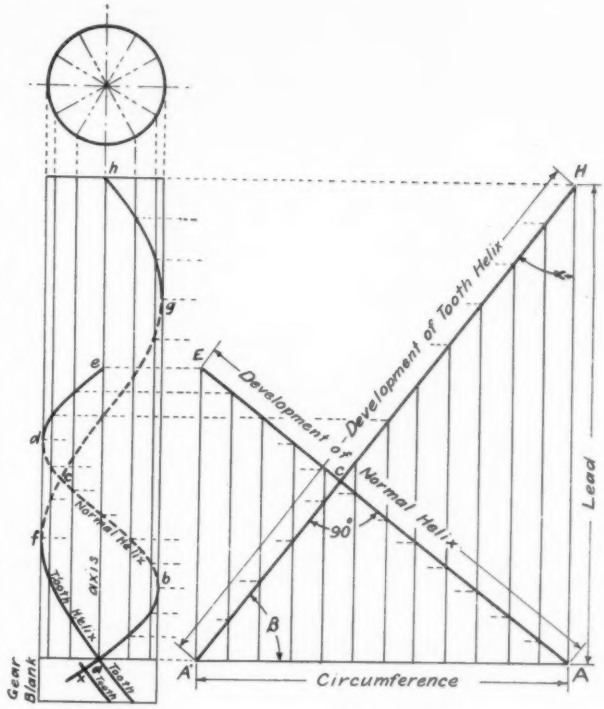


Fig. 3 Fig. 4

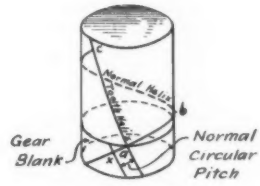


Fig. 5

In designing spiral gears the tooth angle should be large enough to insure the teeth being continually in contact. A tooth on the driver should not go out of contact with a tooth on the driven before the following tooth on the driver commences contact with the next tooth on the driven. Less cryptically stated, —before one pair of teeth go out of contact, the following pair should be making contact. This fact is most important when designing spiral gears with shafts at an angle.

The gears are longer lived because the gradual engagement of the teeth give point contact instead of line contact, as is the case in spur gearing.

If the equipment at hand was unlimited, designing and cutting spiral gears would be a simple matter; but designing gears which can be cut with standard spur gear cutters and the equipment at hand is a more difficult problem.

The following description of designing helical gearing seems to me novel and simple, and at the same time a more definite and accurate method than hitherto printed. It is definite because in starting we assume the number of teeth in proportion to the given

ratio, instead of the tooth angle as is generally done. By doing so we are sure of an even number of teeth, also the correct number of teeth for the given ratio. Accurate, because when cutting the teeth, the spacing is made along a portion of the normal helix, and by this method we compute the exact length of this portion of the normal helix for spacing the teeth.

Explanation: Fig. 3 represents the pitch surface of a spiral gear extended to show one complete revolution of the tooth and normal helices. The tooth helix is represented by the curve afgh. It determines the angle the teeth make with the axis. The normal helix is shown by the curve abcde, and is important in calculating the number of teeth. The normal circular pitch a−x, Fig. 3, is the distance from a point on one tooth to a corresponding point on the next following tooth, measured along the normal helix.

Fig. 4 illustrates the development of the two helices. A′−A is the pitch circumference of the gear. From points A′ and A draw A′−E and A−H perpendicular to A′−A. Then A′−H is the development of the tooth helix and A−E of the normal helix. The length A−C is the portion of the normal helix crossing every tooth in the gear. This is clearly shown by Fig. 5. The length abc, Fig. 3, or A−C, Fig. 4, is always smaller than abcde, Fig. 3, or A−E, Fig. 4.

Problem: Design a pair of spiral gears for parallel shaft with a velocity ratio of 5 to 8, using a 12-pitch standard spur gear cutter, exact center distance being 6.3125.

Procedure.

1. Find the pitch diameter and circumference of the gears, using the following rule: Divide the center distance by the sum of the ratios. The pitch diameter will be twice the quotient multiplied by each term of the ratio.

The formula from which this rule was stated may be derived as follows: Let x and y, Fig. 6, be the radii of the gears; A, the exact center distance; c and d, the ratio; then

$$x:y = c:d$$
$$x+y = A$$
$$dx = cy$$
$$dx - cy = 0$$
$$cx + cy = CA$$
$$(c+d)x = CA$$
$$x = \frac{CA}{c+d}$$
$$y = \frac{dA}{c+d}$$

2. List a number of ratios in proportion to the given ratio that will obtain an even number of teeth in each gear.

3. Assume the number of teeth in ratio list that will give the tooth angle between 20° and 30°. If possible, this angle should not be greater than 20°

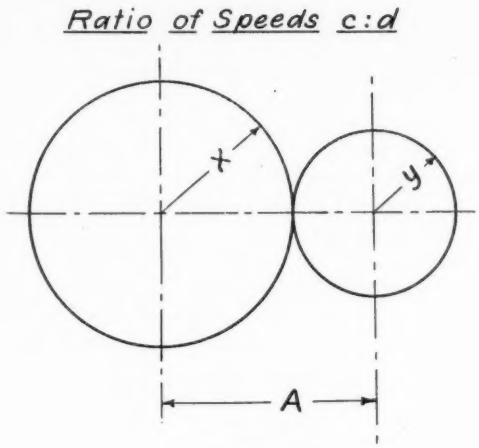


Fig. 6.

in order to avoid excessive end thrust. A little practice will make one expert in the selection of the best ratio.

4. After the number of teeth in each gear has been assumed, multiply the number of teeth in each gear by the normal circular pitch, which is equivalent to the circular pitch of spur gears. This gives the length of the normal helix crossing every tooth, or the distance A−C, Fig. 4.

5. In Fig. 4 we have the right triangle A′CA with the sides A′−A and A−C given. The angle B may now be computed from the formula Sin. B = $\frac{A-C}{A'-A}$ The required tooth angle a will be the complement of angle B or $90° - B = a$.

6. In the right triangle A′AH, Fig. 4, the lead may be determined by the formula lead = $\frac{\text{circumference}}{\text{Tan. of tooth angle } a}$

Computation.

$\frac{\text{Center distance}}{\text{Sum of ratios}} = \frac{6.3125}{13}$ .4856×2 = .9712.

.9712×5 = 4.856 Diam. of small gear
.9712×8 = 7.7696 Diam. of large gear
4.856×3.1416 = 15.2556 = Cir. of small gear
7.7696×3.1416 = 24.4089 = Cir. of large gear.

Referring to the table, the ratio 55 to 88 is chosen for trial.

.262 = Cir. pitch for a 12-pitch Std. cutter, then 55×.262 = 14.410.

Sin. B $\frac{AC}{A'A} = \frac{14.410}{15.2556} = .94457$

B = 70° − 50′ : $a = 90° - B = 90° - 70°\ 50' = 19°\ 10'$.

Proof.

88×.262 = 23.056. Circumference of large gear = 24.4089

$\frac{23.056}{24.4089} = .94457$ = Sin. B. B = 70° 50′.

$$\text{Lead} = \frac{\text{circumference}}{\text{Tan. of tooth angle } a}$$

$$\text{Lead of small gear} = \frac{15.2556}{.34758} = 43.902.$$

$$\text{Lead of large gear} = \frac{24.4089}{.34758} = 70.177.$$

For outside diam. add to pi. dia. twice the addendum, which is the same as for spur gears.

List of Ratios in Proportion to Given Ratios.

5 to 8	45 to 72
10 to 16	50 to 80
15 to 24	55 to 88
20 to 32	60 to 96
25 to 40	65 to 104
30 to 48	70 to 112
35 to 56	75 to 120
40 to 64	80 to 128

Problem for Solution.

Design a 10-pitch spiral gear and pinion, ratio 2:1, shafts parallel, right hand helix, exact center distance 4.8903.

Answers:

	Gear	Pinion
Pitch diameter	6.5204	3.2602
Outside diameter	6.7204	3.4602
Tooth angle	37° 6′ 28″	37° 6′ 28″
Lead	27.08″	13.54″
Number of teeth	52	26
Whole depth of tooth	.2157	.2157

Machining Spiral Gears.

Sequence of operations in cutting spiral gears on milling machine.

1. Place dividing head flush with end of milling machine table so change gears may be placed thereon.
2. Put change gears on machine that will give the required lead.
3. Try out for lead by making a mark on table and cross-slide. Move the dividing head one revolution and measure distance between marks; it should equal lead to within 1-32 of an inch.
4. Place blank on mandrel, dog on mandrel, and mandrel between centers of dividing head and tail stock.
5. Set the milling machine table equal to the tooth angle of the gear.
6. Find center of blank, using surface gauge.
7. Set cutter central by moving cutter backward and forward over center line of blank. Feeding the moving cylindrical cutter backward and forward so as to intersect slightly the cylindrical surface of gear blank, a small ellipse is formed. This ellipse should intersect centrally the center line procured with surface gauge.
8. Place cutter so that it just touches the outside diameter, then raise the machine table a distance equal to the whole depth of tooth.
9. Take first cut across the blank.
10. Index for next tooth. Indexing is the same as for spur gears.

WM. C. ASH,
Director of Vocational Education, Philadelphia, Pa.

Mr. Ash, who was principal of the Philadelphia Boys' Trade School, has been appointed by the board of education to the position of Director of Vocational Education. Mr. Ash is a graduate of the Northeast Manual Training School and of the University of Pennsylvania. He has been principal of the trade school since 1907 and previous to that time had thirteen years of practical industrial experience.

Middle-West Vocational Education Meeting

The Vocational Education Association of the Middle West held its first post-war convention in Chicago on January 16, 17 and 18 with a record breaking attendance. The sessions impressed the men and women present with the great strength which the movement is gathering and the steady progress which has been made during the year 1918, despite war conditions and the setbacks due to the lack of teachers and the diversion of popular interest. The convention did not develop so strong a discussion of post-war reconstruction as might be expected, but there was evidence in many of the papers that the problems of readjustment are very much in the minds of the leaders. We are still too close to the recent conflict to fully turn our backs upon it, to sum up the lessons that it has taught and to face the new day without misgivings.

The Sessions.

In his opening address Mr. A. G. Bauersfeld, president of the association, struck a strong note by arguing for vocational education as a means of stabilizing our economic and industrial system and of preventing the doctrines of socialism from gaining a foothold. All vocational education, in Mr. Bauersfeld's opinion, must have cultural education as a foundation. A similar argument was presented by Dean Andrew F. West of Princeton, in an address on the Relations of Cultural to Vocational Education. A bolshevik movement is bound to develop in America if the youth of the nation is limited to vocational studies. "If nine-tenths of our young men are to get nothing more than vocational studies," he said, "they are condemned to advance to industrial serfdom and are on the way to form a huge proletariat of discontent, the gravest menace our democracy can encounter."

"Lessons of the War for Vocational Educators" was the topic presented by Dr. David Snedden. An outstanding feature of the address was a severe criticism of high schools. In the speaker's opinion high schools had better discontinue

the pretense of teaching subjects which they do not understand. "I do not believe in mixing vocational and general education," he said. "Our industrial education scheme has to have a new start.

"We must recognize the change of conditions which the war has brought and train men and women not in the passing handicrafts, but as operators of machines. In vocational schools it is ridiculous to try to teach 16-year-old girls anything about home-making, for they are too far away from the proper mental attitude for the studies. Thus far we have only been playing with vocational education."

The second session was divided between Miss Florence Marshall, of New York, Miss Cora Davis, of Illinois, and Dr. Snedden, in discussions of vocational and home economics teaching. The danger that women will lose the places they have in industry does not lie in the returning soldiers but in the fact that women and girls have become too highly specialized in their trades, according to Miss Marshall.

The way for women to meet the possiblity of unemployment is to learn at least one trade, in Miss Marshall's opinion. When the wave of unemployment swept over the country several years ago and New York started municipal workshops to give labor to women, only one girl was found in them who had been to a trade school. Many girls had been thrown out of their regular work, but with their training they had been able to get other jobs.

Friday's Sessions.

On Friday morning Miss Helen T. Woolley discussed the possibilities of psychology as applied to vocational guidance, and Miss Marshall described the tests which are used in the Manhattan Trade School for Girls. Mr. Frank M. Leavitt described in detail the guidance program which has been worked out in Pittsburgh and which is being developed in that city. "Vocational guidance to different people," said Mr. Leavitt, "ranges all the way from a sort of occult science of vocational mind reading to an exact science based on the classification of thousands of cases. Meanwhile thousands of children stand in dire need of vocational guidance in the simple and literal meaning of the two words. We must undertake to say just what a school system ought to do in order to afford some measure of guidance to its children.

"Vocational guidance will mean that educational authorities will be charged with the supervision of all young people up to at least 18 years. This will mean employment supervision as well.

"As organized in Pittsburgh, the vocational guidance department now consists of a director, a field secretary, a placement secretary and a clerk. Its work is divided under four heads: 1. Guidance in upper elementary grades. 2. At the time of leaving school. 3. Thoro part-time cooperative work. 4. Guidance thru high school by vocational counsellors."

At the afternoon session, Mr. Charles T. Clayton described the industrial training service of the U. S. Department of Labor. He followed the lines of his paper in the February issue of the Magazine. Mr. William T. Bawden, of the Bureau of Education, called attention to a pamphlet of which he is the author, on "War Projects in Industrial Arts in High Schools." He suggested that the specific recommendations in this pamphlet be applied to the reconstruction of industrial arts courses. The treat of the afternoon was a discussion of War Psychology by Dr. G. Stanley Hall.

Mr. William J. Bogan presided over the annual dinner in his usual happy manner. The best paper of the evening was an appeal for teaching citizenship by President L. D. Harvey, of Stout Institute. The surprise of the evening was an Illinois legislator, Harold Kessinger, who discussed the need of complete vocational education as the antidote for the troublesome reconstruction times which are to come.

The Saturday Program.

Part-time Co-operative Education formed the opening topic of Saturday morning. Mr. Frank M. Leavitt made his paper intensely practical by limiting himself to the experience and the plans of Pittsburgh. Mr. E. E. MacNary repeated his illustrated address on teacher training in the shipyards of the Emergency Fleet Corporation. The remarkable work

MR. CHARLES A. BENNETT
Peoria, Ill.,
President-elect Vocational Education Association
of the Middle-West.

of training mechanics for army service during the past year was described by Mr. Philip Woodworth. By limiting himself to the experience of the north-central states over which he had supervision, Mr. Woodworth showed that the federal board had exceeded all demands of the war department and had established a truly remarkable record in establishing and conducting short courses. The extremely unsatisfactory legislative situation which has existed in Illinois was described by Mr. Harold Kessinger. Prof. D. J. MacDonald contributed a distinctly professional note to the meeting by outlining the principles which should control a grading scheme in trade subjects. He held that such a system should be based on standards which prevail in industry and should be calculated to develop the student to meet the requirements of the shop.

"It is time, capital and labor worked together for mutual benefit," declared John J. Arnold in the final talk of the session. "The interests are identical. But both have a chip on their shoulder. They clash and seek legislation and bring on more clashes."

The successful efforts of Wisconsin in making apprenticeship an integral part of a scheme of industrial education and a valuable adjunct to the development of all-around mechanics, were described by Mr. Stewart Schrimshaw. Mr. Robert L. Cooley, of Milwaukee, argued for part-time education of adults and Mr. E. A. Wreidt described the beginnings in industrial education which have been made in Illinois under the Smith-Hughes law.

The Vocational Education Association of the Middle West is industrious and economical of time—during the convention four noon and evening lunch conferences were held. At each there were informal addresses and discussions and these were as valuable in many respects as the general sessions.

The meeting elected for 1919-20 the following officers:

President, Charles A. Bennett, Bradley Institute, Peoria, Illinois.

Vice-Presidents, Dean W. W. Charters, University of Illinois; William Bachrach, Chicago; Supt. Mary D. Bradford, Kenosha.

Secretary-Treasurer, Leonard Wahlstrom, Chicago.

WILL MEET IN NEW YORK.

The officers of the Eastern Arts Association have announced that the tenth annual convention will be held in New York City, April 17, 18 and 19. Mr. Augustus F. Rose, Providence, R. I., and Mr. E. B. Kent, Newark, N. J., president and sescretary repectively, are looking after the general advance arrangements and the program committee headed by Mr. Frank E. Mathewson of Jersey City, is preparing the program.

The general topics of the meeting will be the new demands placed upon the arts teachers during the reconstruction period. The speakers are to include leaders in education, and art and the art industries. Special sectional programs are to be devoted to the special interests of teachers of the manual arts, household arts, school gardening, etc. It is planned to make the department at gatherings especially strong in the direction of concrete suggestions for practice. A limited exhibition of students' work and of art and shop materials, etc., will be held.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

THE KIDDIE KART AS A SHOP PROBLEM.

John W. Cavileer, Montclair, N. J.

The accompanying drawings show an excellent problem to interest boys who have a younger brother or sister.

It is a fine individual project or can be made in large numbers for Christmas or Red Cross sales.

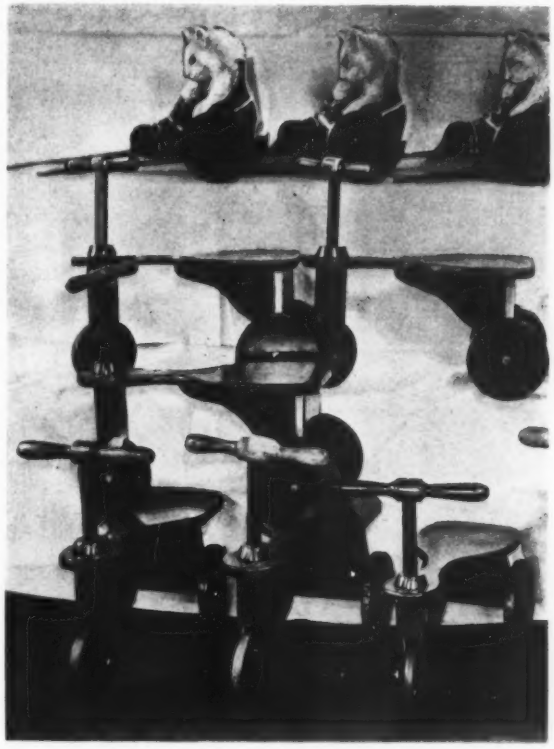
A large number of these karts were recently constructed in the author's class at Montclair, N. J., for a Christmas sale, and the proceeds were given to the Junior Red Cross. After two years of directing the construction of the karts, and trying them out at home with various children, the author finds it a great advantage to build the top or seat 10″ wide in order to spread the wheels far enough apart so that the youngster's heels will not catch in them, and still keep the wheels beneath the seat.

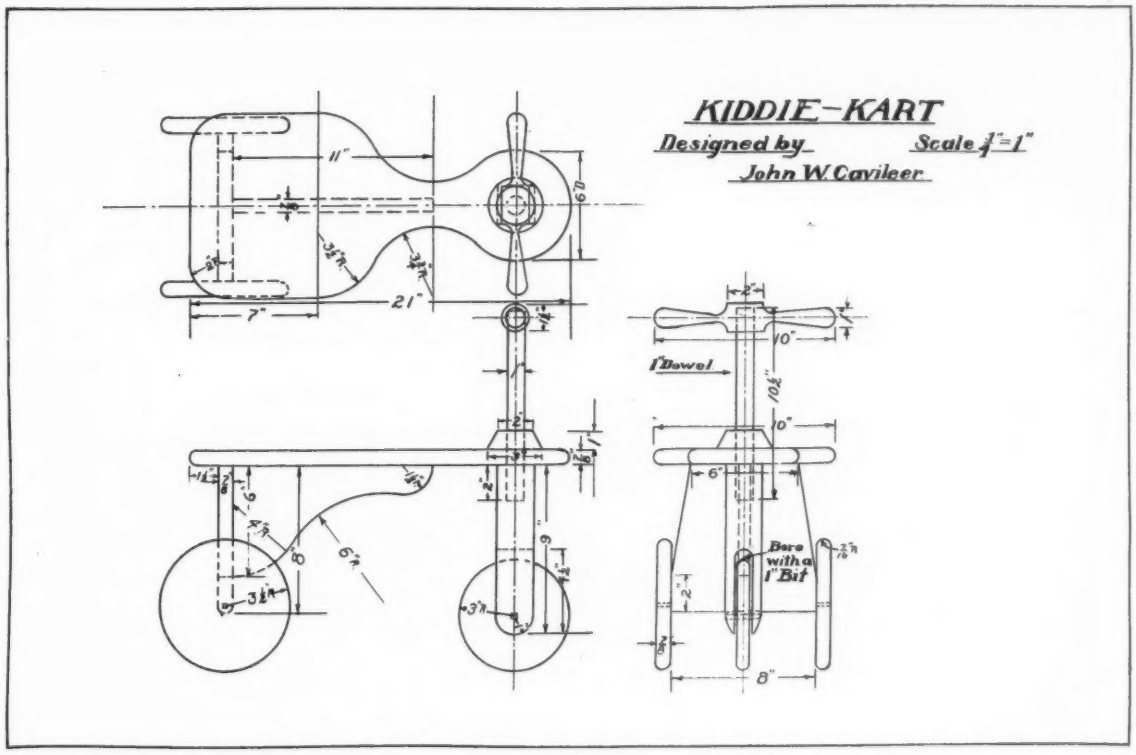
Before starting the work of building the karts for the sale, the classes were seated in the demonstration circle and the drawings and various parts gone over so that each detail was thoroly understood by each boy. Then the classes were divided up into squads of three with a foreman over each group. The instructor acted as a general superintendent or an advisor.

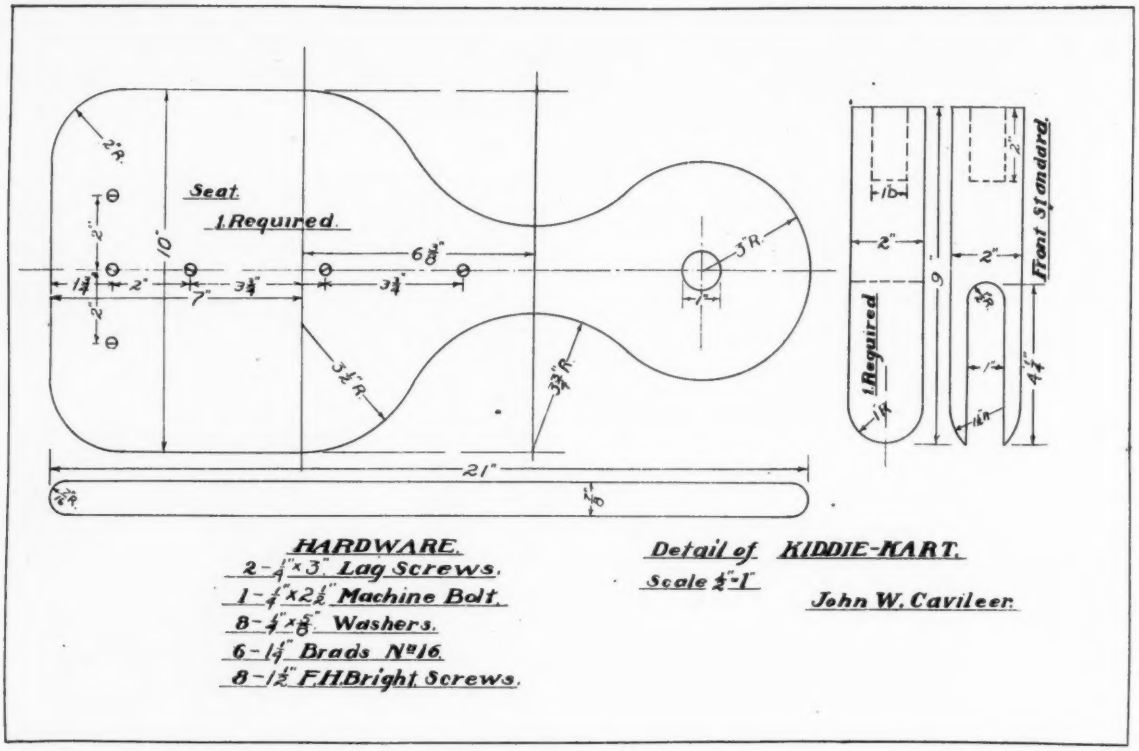
Each group was responsible for one kart, and it was the foreman's duty to see that the work was completed.

The handle bars were turned from 2″x2″ maple stock. It made an excellent turning model for the seventh grade. Altho these handles were turned, it does not necessarily mean that they must be done on a lathe, for the author got very good results by having the boys shape them by hand after some few modifications.

The seat, rear brace, and wheels were made from $\frac{7}{8}$″ poplar stock, and after each was drawn out by the foreman the rest of the work was executed with the turning saw and spoke shave by his group.



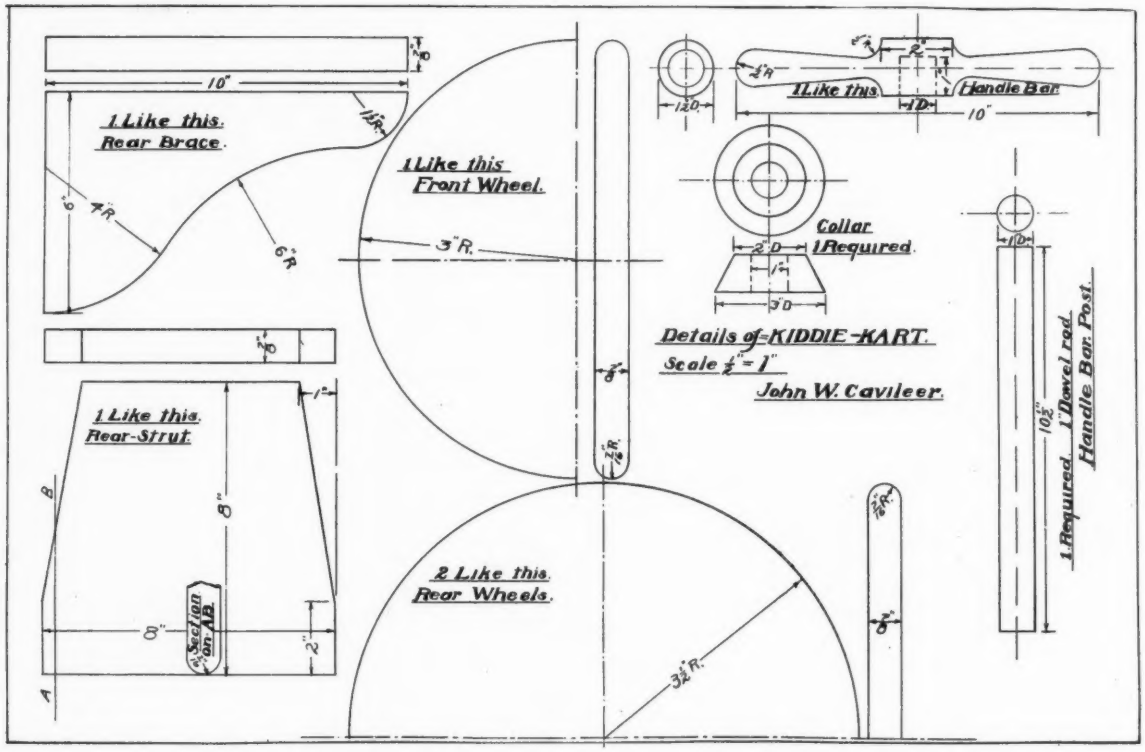




The rear strut was made from ¾" poplar stock, first being 8"x8" square, then rounding the bottom edge. The sides were tapered from 8" at two inches up from the bottom to 6" at the top, thus giving clearance for the wheels.

The front standard was cut from 2"x2" piece of maple 9" long. A 1" hole was bored 1½" deep at one end and a 1" dowel 10½" long glued and fastened by two 1¼" brads at 3¾" from the other end of the standard. A 1" hole was bored thru it and cut down as shown in the detail drawing.

The collar was made from a 1" piece of maple or other hardwood 3" in diameter at the base and 2" at the top. A hole 1" in diameter was bored thru the center to allow the dowel to pass thru it. After all the parts were cut out and sanded, the rear strut was fastened to the seat by three 1½"



No. 9 F. H. screws, then the brace was put in place by the same number and size screws.

The wheels were finished with two coats of red paint and the rest of the kart was finished in a bright yellow except the handle bars, and they were finished with two coats of varnish.

After being assembled, two coats of spar varnish were applied, and the karts were ready for sale.

A FOLDING DESK.

J. J. Schmitt, Jr., Rochester Shop School,
Rochester, N. Y.

The accompanying cuts illustrate a desk which has been designed especially to economize in space and material without any reduction in practical value.

Two spaces are provided for book and stationery storage. For safety and stability the desk must be secured to the wall or woodwork.

The desk is an excellent model for manual training classes.

SEWING CABINET.

R. L. Wilson, Supervisor of Manual Training,
Keokuk, Iowa.

The sewing cabinet, illustrated in the accompanying drawing, was designed to accommodate several high school cabinet making students and to fulfill the paneled project required.

By the detailed drawing of the top drawer and till, you will notice, pegs for spools, which are 8d nails, with heads removed, and then driven into the bottom of the drawer. They should be short enough to allow movement of the till, and spaced to conform to the number desired. The till is designed to furnish a place for needles, buttons, etc. It should be constructed so as to rest on strips screwed to the sides of the drawers to allow movement, backwards and forwards.

The second drawer and cabinet below are designed to serve as a place in which to keep articles which need mending.

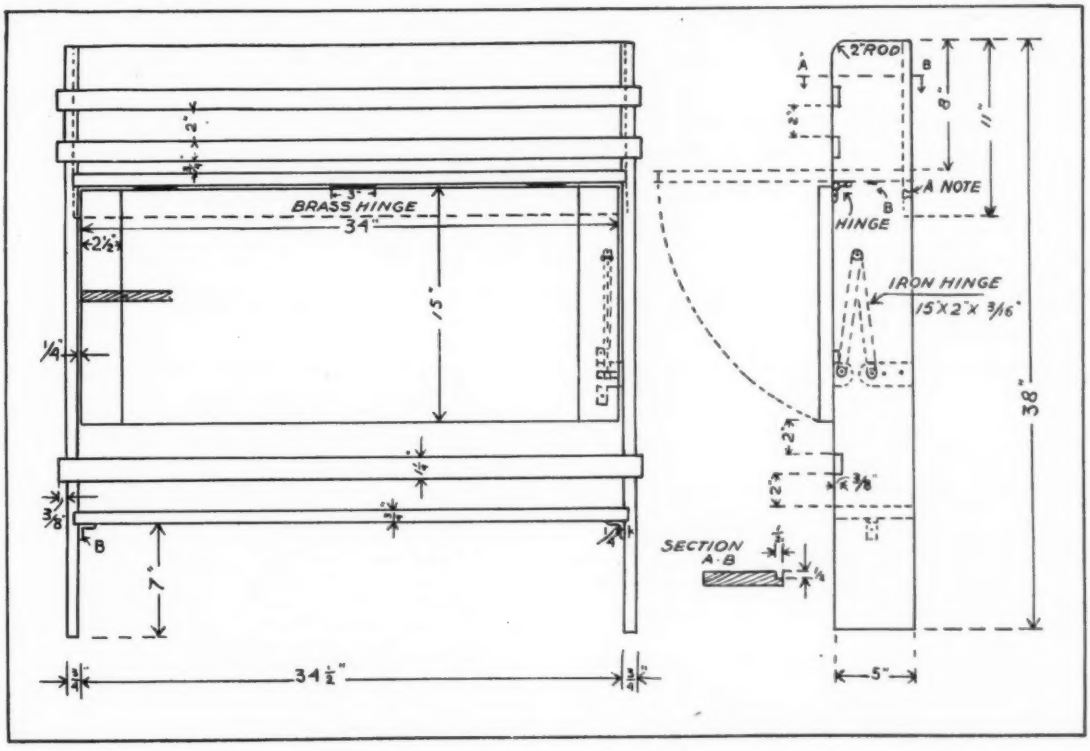
The door can be built up solid or further paneling work can be brought in by constructing a paneled door.

A few construction points are as follows: The back panels and the front should be built up first. The bottom should support the paneling on three sides, the back edge of which should have the outside shoulder or flange removed to allow it to go into place when building up the sides. A strip should be glued on to replace the missing flange.

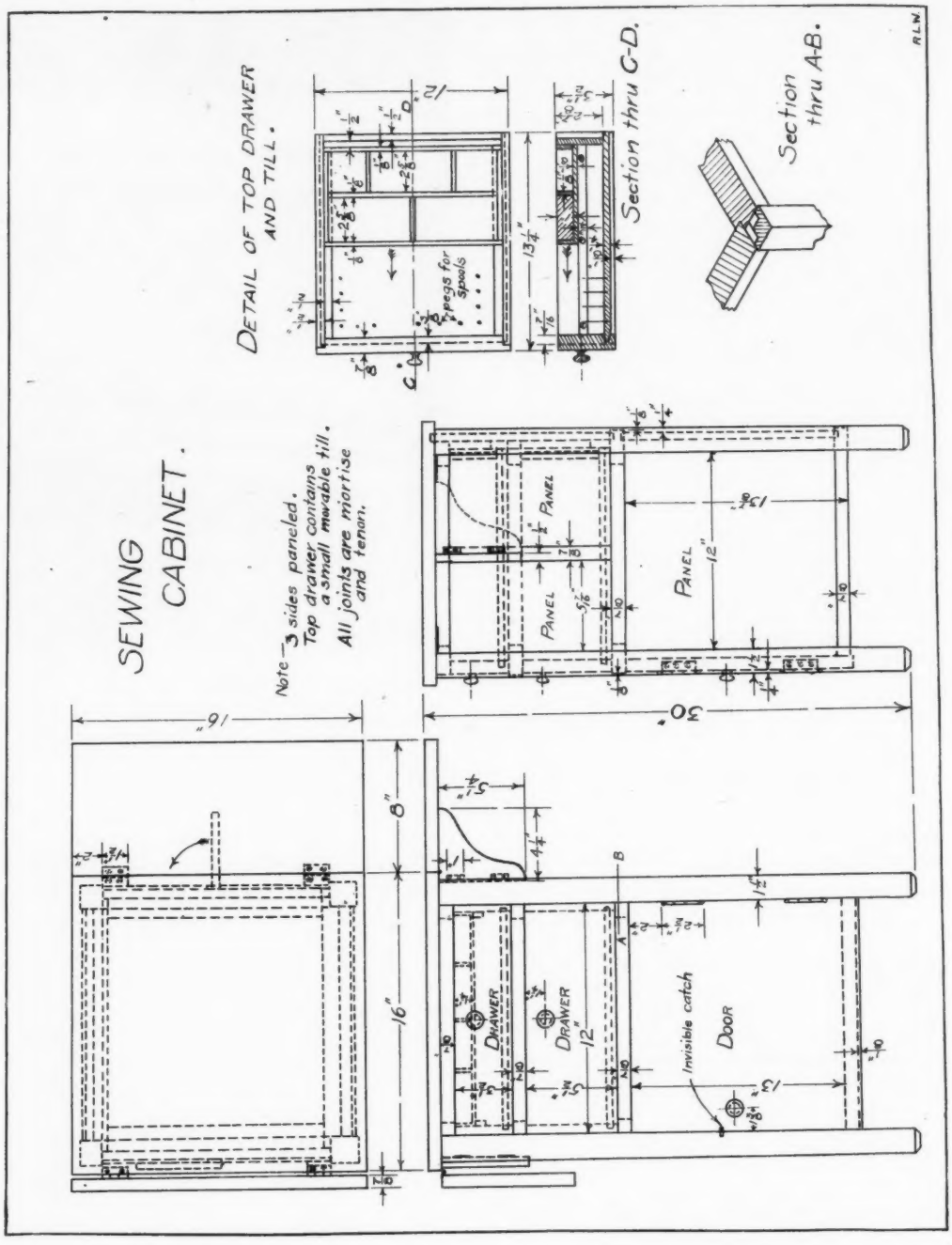
In order to have the back symmetric with the other three sides it should be built up with two panels, divided horizontally.

The material (oak and hardware) in our locality costs about $5, which I think is a fair estimate of its actual cost.

The Folding Wall-Desk.



DETAILS OF FOLDING WALL DESK.



DETAILS OF SEWING CABINET.

Bill of Material.

4 posts—1¼″x1½″x29¼″—s-4-s—oak
1 top—⅞″x16″x24½″—s-4-s—oak
9 front and side rails—⅞″x2″x13½″—s-4-s—oak
3 back rails—⅞″x1½″x13½″—s-4 s—oak
1 drawer front—⅞″x3½″x12″—s-4-s—oak
1 drawer front—⅞″x5½″x12″—s-4-s—oak
1 door—⅞″x12″x14″—s-4-s—oak
1 intermediate board—⅞″x14¾″x13⅞″—s-4-s—oak
2 false vertical rails—¾″x⅞″x9⅞″—s-4-s—oak
2 leaf supports—½″x5¼″x4¼″—s-4-s—oak
1 glue strip—½″x½″x12″—s-4-s—oak
3 top panels, veneered—⅜″x12½″x10⅜″—s-4-s—oak
3 bottom panels, veneered—⅜″x12½″x13½″—s-4-s—oak
2 drawer blocks—⅞″x2″x13½″—s-4-s—soft wood
2 drawer bottoms—¼″x12¾″x11½″—s-4-s—soft wood
2 drawer sides—½″x5½″x12¾″—s-4-s—soft wood
2 drawer sides—½″x3½″x12¾″,s-4-s—soft wood
1 drawer end—½″x4⅞″x11½″—s-4-s—soft wood
1 drawer end—½″x2⅞″x11½″—s-4-s—soft wood
2 till supports—½″x¾″x11⅝″—s-4-s—soft wood
2 till sides—¼″x1¼″x11″—s-4-s—soft wood
1 till bottom—¼″x5½″x11″—s-4-s—soft wood
1 till partition—¼″x1″x10½″—s-4-s—soft wood
2 till partitions—¼″x1″x5½″—s-4-s—soft wood
2 till partitions—¼″x1″x2⅝″—s-4-s—soft wood
Four 1½″ brass hinges and screws
Four 1″ brass hinges and screws
Two 2½″ bronze hinges and screws
3 bronze knobs
1 invisible cabinet door catch.

MURAL PAINTINGS UNVEILED.

Supported by the whole student body, so that its circulation is about 3,000, The Ledger, the monthly school paper of Commercial High School, Brooklyn, has had an annual treasury surplus for the past ten years. Encouraged by the late principal, William Fairly, the management of the magazine voted to use these profits in the creation of a fund for two much needed mural paintings. Graduating classes, as well as the Municipal Art Society, helped to further the project with additional funds.

When the beautiful auditorium of the school was designed, a panel 14x17 feet was placed at each side of the stage opening. It was the architect's intention to have the paintings fill these framed areas. This has now been accomplished.

Considering the type of school, the subjects "Ancient Commerce" and "Modern Commerce" were appropriately chosen. They contrast the quiet which characterized trading in the past centuries, with the hustle which accompanies business today. The scenes on the sands of an oriental port, and the edge of a dock in Brooklyn furnish the themes. Despite the fact that there are about the same number of figures on each canvas, skilful composition has given the desired contrast of peace and hustle. In "Modern Commerce," the management of cloud masses, the repetition of straight lines, as well as the greater action of the figures give the required busy effect. Rythmic lines and balancing mass forms make for beautiful composition in these pictures.

ANCIENT COMMERCE: A Mural Painting in the Brooklyn Commercial High School.

The auditorium has a subdued light during the majority of school days. For this reason the Chavannesque ideal of high keyed and greyed tones in mural painting was not adopted. Rich, broken colors were employed instead. Despite their richness, they hold their places on the wall. They are well balanced and harmonize with the brown seats and creamy-tinted walls.

Admirable draughtsmanship is another characteristic of the works. The figures are heroic in character. Instead of the usual small studies, enlarged by the squared or stereoptican methods, the artist drew his large nudes directly on the canvas, and draped these from models. Greater spirit and spontaneity of action were obtained. It took about a year for the murals to be painted. Mr. A. J. Bogdanove, the artist, has assisted C. Y. Turner and the late F. D. Millet, and has decorated the walls of two large institutions.

Little did the students of Commercial dream that when they displayed school spirit thru their whole-hearted support of the monthly paper they would indirectly help to decorate their auditorium with two splendid paintings.—*Morris Greenburg.*

NEW BOOKS

Industry and Trade.

By A. L. Bishop and A. G. Keller. Cloth, 12mo, 432 pages. Price, $1.32, net. Ginn & Co., Boston, Chicago.

American schools have studied our industries and our trade for many years—by indirection. The children have studied commercial geography; they have dabbled in commerce thru snatches of its history as woven into our political and social histories; and their attention has been directed to the influence of trade and commerce upon our institutions as these latter have been brought out in the civics class. But trade and industry, as such, have never, or very, very rarely, been taught for themselves. And still more than ninety-five per cent of all boys who go thru the schools enter some trade or some branch of commerce; nearly fifty per cent of the girls at some brief time in their lives are engaged in an occupation that is industrial or commercial—and one hundred per cent of our people are dependent for their livelihood—food, clothing, shelter—on our primary and secondary industries and on the trade which they create. With these thoughts in mind the question arises, Why in the name of common sense, do we not teach the industries? Why beat about the bush?

The present book is concrete evidence that at least two educators believe in teaching the facts of our industrial and commercial life in the high schools. The book is a rather simple but wholly adequate account of our agricultural, animal, mineral, and manufacturing industries. It includes a comprehensive chapter on the basic factors—land and people—which have contributed to our economic greatness. Our means and methods of transportation are described and a final chapter discusses the promotional activities which are making for our supremacy as a commercial world power.

The book recommends itself most strongly for trade classes, commercial classes and general economics courses. The treatment of each industry is brief but pointed. The present importance and extent of each is followed by a historical sketch of its origin and development and facts and figures are added to give a good perspective on its economic and civic importance.

No student can drop this book without a good grasp on the chief elements of our American workaday life as it has existed and as it is growing, living and developing at the present time.

Yarn and Cloth Making.

By Mary Lois Kissell. Cloth, 252 pages. Price, $1.60. The Macmillan Co., New York.

This book is intended to serve as a text and reference book for classes in the history of spinning and weaving, preliminary to a general study of fabrics. It contains comprehensive bibliographies and lists of illustrations. It would appear to us that the author would have made the work of far more direct value had she frankly written a history of textiles and a description of the various developments of textile processes as they have occurred in different countries. As it is, the reader must consult numerous references to study any one section of the work. This would be quite satisfactory, perhaps, if the average teacher had access to even a very limited number of the English, French and German books referred to.

A CORRECTION

The attention of readers is called to a regretted typographical error in the February Magazine, by which Messrs. Metz and Tarbell, authors of the paper on "Mathematics for the Apprentice," apparently state an erroneous mathematical fact. On page 61, the sentence beginning in the thirteenth line of the first column should read:

"A piece of tin cut into an 8 by 8 inch square and another piece of the same tin cut into an 8-inch circle, may be separately weighed in order to show the pupil that the area of a circle is *equal to about three-fourths of the area of a square with sides* equal in length to the diameter of the circle."

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Matching Mahogany Piano Case.

893. Q.—I have to match an old piano case of mahogany which was stained a light golden brown. Could you tell me what to work with to get the mahogany I am working with the desired tone?—*S. C. F.*

A.—A light golden brown on mahogany can be obtained in one of several ways:

First, thru the use of picric acid. Make up a solution of one ounce picric acid powder in a cup of warm, denatured alcohol, using a china cup. Stir until thoroly dissolved, then add enough warm water to make one quart.

With this solution as a basis and a sample of the new wood for trial the correspondent can increase or decrease the volume of color at will. He should not judge the color of the stained piece until it has thoroly dried and been given a thin coat of orange shellac, reduced one-half with alcohol. If the tone is too bright a yellow and not enough of the brown, the addition of a small amount of potassium bichromate crystals, one teaspoonful to the quart of acid solution as a start, will show him how to adjust these two colors until the proper shade has been reached. You will understand, of course, that it is impossible to give an absolute formula for the production of a definite color without a sample for matching and experimental data.

Care should be used in the handling of the picric acid since it tends to penetrate very deeply into the skin, leaving it an unsightly yellow. It would be best to buy a pair of cheap rubber gloves or else treat a pair of old kid gloves, free from holes, with a brush coat of hot paraffine, which when cool will do quite as well as rubber.

Following the application of the stain, the work should be given a light coat of orange shellac reduced one-half with alcohol and when thoroly dry should be sanded smooth with 00 sandpaper. This should be followed by a Silex filler tinted to match, or in pleasing contrast of a deep shade of brown, and allowed to dry 48 hours before varnishing in order to be sure that the surface is perfectly clean and ready for varnishing. It should be gone over very carefully with worn-out 00 paper so as to clean off any slight smudges of filler remaining from the previous operation.

The work should then be thoroly dusted off, removed to a warm, dry, dust-free room and given three to four coats of varnish at intervals of one week. Previous to varnishing, the use of a tacky cloth, made by wringing out a cloth in varnish and using it to wipe off all surfaces before applying the varnish, will aid greatly the production of clean work. The first coat may be sandpapered smooth with 00 but all other coats should be well rubbed out with F pumice stone, felt pad and water. For piano polish work, the last rubbing is done with rotten stone, skipping a day between the rotten stone and pumice stone rubbings. Wash off thoroly and clean up with a good oil polish.—*Ralph G. Waring.*

Glues for Cabinet Work.

896. Q.—My grandfather was a cabinet maker and used to make his own glue. I know that it is not practical nowadays to make glue, but it is very difficult to get good glue for important jobs and I would be very glad if I could make it. —*E. A. B.*

A.—Replying to the inquirer, I would state that he can get No. 3 B. glue from Peter Cooper Co., 13 Burling Slip, New York, N. Y.; Diamond Glue Co., New York and Chicago; Armour Glue Works, New York and Chicago, or J. O. Whitten Co., Boston, Mass.

The glues purchased should be bought as good hide stock, sweet, free from grease or foaming and for economy's sake should be ground. In this form the glue should be mixed with an equal bulk of cold water or in the case of especially good stock, a trial test should be made of at least four samples which need not be more than a teaspoon of each in order to determine the proper amount of water for the specific glue. Before melting the glue should absorb enough water to be perfectly clear, retain the original rough outline and permit being squeezed between the thumb and finger without appearing to mush up. The glue should be heated only enough to bring it to the steaming point and to permit thoro mixing. It should not be heated longer than necessary nor should it be made up in too large a quantity at one time. Avoid continuous low heat, since this practice will rapidly reduce the tensile strength of high grade glue four or five grades in as many hours. Here in Syracuse we are now paying fifty cents for 3 B. glue, stock which sold in 1914 for twenty-seven cents. If anything, the grade is a little cleaner and the last boiling we bought was as sweet a glue as I have ever handled.

The use of such glues as Le Page's should be discouraged at all times since it is compounded on an entirely wrong principle. When cold and dry it is crystalline and very hard instead of being tough and fibrous. It has been my experience in piano factory work to note where this kind of glue came up thru six coats of finish and otherwise ruined a very high grade piano case. It is entirely unsuited to any grade of cabinet work designed for permanence and beauty, since it can never be relied upon to stand up under use in spite of statements of manufacturers to the contrary.—*Ralph G. Waring.*

Toy Making Materials.

909. Q.—Can you give me some technical information concerning the materials used in making the toys described by Miss Dorn and Miss Waigli in the February Magazine? —*A. F.*

A.—*Wood.* This year it was very difficult, nearly impossible, to get the three-ply laminated stock most desirable for much of the work, owing to the government use of these products. Most of the toys were made of scraps selected from the left-over bits kindly donated by one of the patrons of the school, the owner of a woodworking plant. Nearly every school has as patron one or more people connected with some such plant. By requesting that blocks, scraps of three-ply material and other usable kinds of wood be saved for school purposes, it is very likely that much can be obtained. Conditions next year will doubtless again permit such purchase as is necessary. Beaver board serves satisfactorily; it can be used easily with the coping saw and takes color well. Dowel rods, wooden beads, glass beads, are used in various ways. What is true of wood scraps is true of many kinds of things which the children will salvage and make use of. A study of the parents' occupations will bring to the mind many possibilities.

Color. In the order of difficulty, the color mediums are: oil crayons, water color from the paint boxes, water color mixed by the use of powder provided for wall coloring, oil paints, enamel.

The dry powders range in price from $0.08 a pound for the white, to $0.52 a pound for black and canary yellow. It was found that the white is very unsatisfactory when a coat of varnish is later applied; some chemical action, resulting from the combination of the varnish or the shellac with the white, streaks it badly. Use instead dry zinc powder. A palette of black, red, blue, yellow, orange, violet, green, and white zinc powder, permits of many mixtures and variations.

The directions accompanying the powder call for water in the proportion of five parts of powder to three of water. Upon trial, however, this runs badly. It may be overcome by mixing two parts of cold water, one part of mucilage, five parts of dry powder. This hardens and sticks so well that it can be gone over with a coat of white shellac or of varnish and made entirely waterproof. It is best to experiment with the mixing of the various colors, as some of the powders vary from others in their behavior.

The ease with which it is possible to "clean up" after the use of the above medium is one great advantage of its use over oil paints and enamels.—*Emily A. Dorn.*